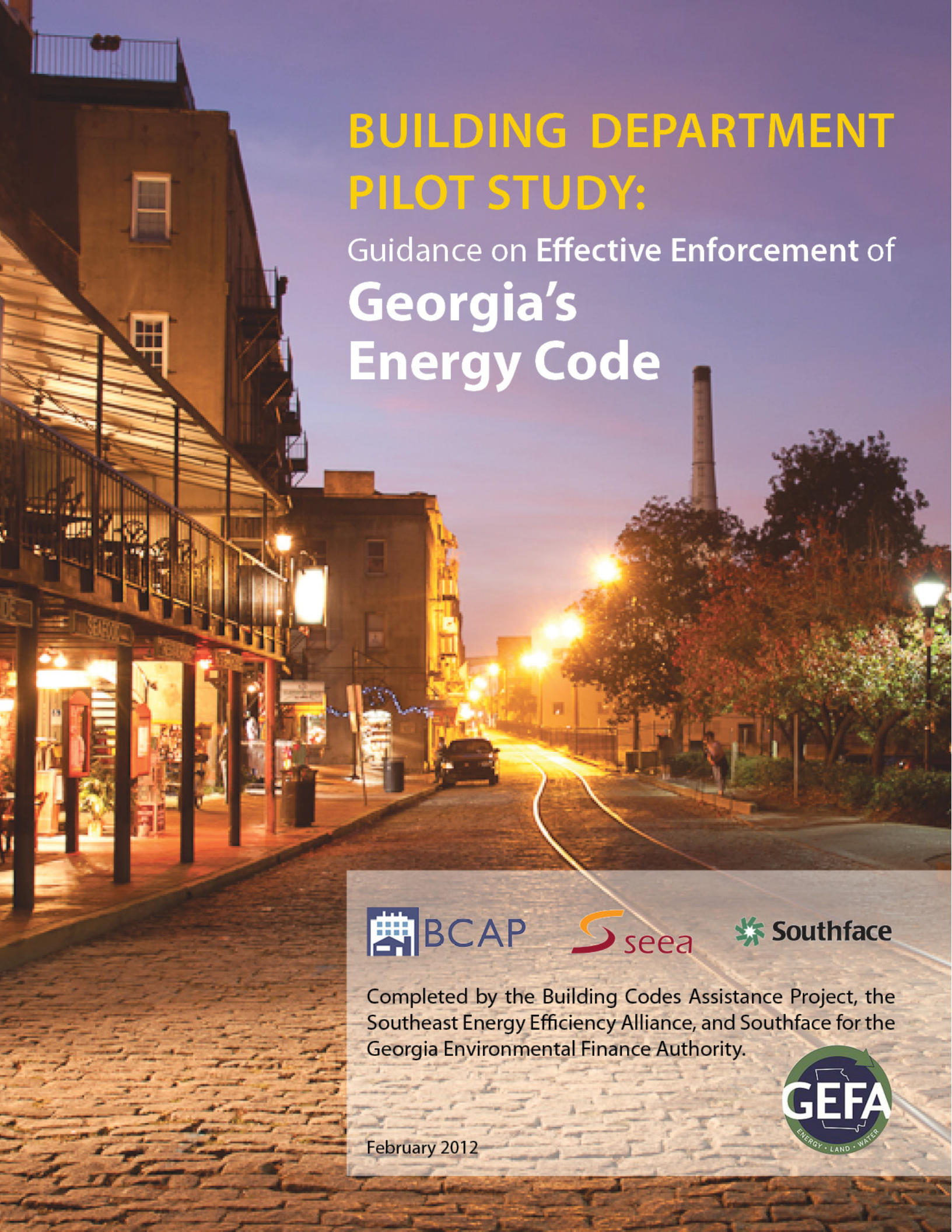

BUILDING DEPARTMENT PILOT STUDY:

Guidance on **Effective Enforcement** of **Georgia's Energy Code**

BCAP seea Southface

Completed by the Building Codes Assistance Project, the Southeast Energy Efficiency Alliance, and Southface for the Georgia Environmental Finance Authority.

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February 2012

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Section One:
Introduction

Among other efforts to save energy for Georgians, energy efficiency is considered one of the easiest and most-effective strategies available to decision makers, consumers and industry. And nowhere is the opportunity more apparent than in the building sector, which accounts for almost 40 percent of total energy use and 70 percent of electricity use in the U.S. Moreover, the average lifespan of a building is roughly 50 years, meaning that current building energy policies—and what gets built—will affect energy consumption until 2060 and beyond.

While the development and adoption of energy codes are the necessary first steps, they alone do not guarantee compliance. In municipalities across the country, energy code enforcement and compliance remain insufficient or, in some cases, completely absent. Cities, counties, and other jurisdictions must develop and carry out realistic and effective energy code implementation strategies to ensure that energy codes accomplish their intent to reduce energy use and save money for consumers and businesses.

Achieving compliance with energy codes saves residents and businesses money by reducing energy consumption, which lowers utility bills. Moreover, as energy prices increase, so do monetary savings from compliance with energy codes. Savings from energy efficiency measures increase consumer purchasing power and companies' ability to lower costs and invest in their businesses, ultimately aiding Georgia's economy. A recent white paper on the benefits of compliance with the energy code in Atlanta estimates that full compliance with the Georgia energy code will save Atlanta residents and businesses approximately $13.7 million over a five-year period.[1]

Efforts to improve energy-efficiency through building codes in Georgia received a boost on March 29, 2009, when former Gov. Sonny Perdue pledged that the state, or the applicable units of local government that have authority to adopt building codes, would implement a plan to achieve 90 percent compliance with DOE target energy codes (2009 International Energy Conservation Code (IECC) and American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1-2007) by 2017.[2] To fulfill that pledge, Georgia adopted new residential and commercial energy codes (the 2009 IECC plus Georgia Amendments) that went into effect in 2011. Georgia now requires each builder to meet the minimum requirements of the energy code. However, it is the charge of each responsible city, town or county building department to determine how to enforce the 2011 energy code to reach 90 percent compliance.

Because there has been no large-scale study on enforcement of the residential energy code in Georgia, the compliance rate with the residential energy code in Georgia is unknown. However, other states report that 40 to 50 percent of homes do not meet their residential energy code requirements.[3] In 2010, the Georgia Department of Community Affairs (DCA) analyzed the rate of compliance with ASHRAE 90.1-2007. DCA found that these

[1] *Benefits from Effective Energy Code Implementation*. Tech. Southface and Sustainable Atlanta, Feb. 2012. Web. <www.southface.org/ga-energy-code>.
[2] Compliance with Section 410 of the American Recovery and Reinvestment Act." Letter. 25 Mar. 2009. *Compliance with Section 410 of the American Recovery and Reinvestment Act*. GEFA. Web. <www.gefa.org/Modules/ShowDocument.aspx?documentid=953
[3]Yang, Brian. "Residential Energy Code Valuations: Review and Future Directions." *EnergyCodes.gov*. BCAP. Web. <www.energycodes.gov/publications/research/documents/codes/bcap_res_eval_2005.pdf

commercial buildings achieved a compliance rate of 80 percent with the requirements contained in the not-yet-enacted energy code.[4]

This report, while focusing on Savannah and Chatham County, is designed to illustrate how code departments can operate and enforce the energy code, finance operations, incorporate new changes to the energy code inspection process in the future, and provide best practices and recommendations for improvement from the departments, which other municipalities could use as a model to improve compliance in Georgia. The selection of Savannah and Chatham County provide examples that mirror many other cities and counties throughout the state. These examples should provide a map towards a more energy efficient future for Georgia.

[4] The commercial buildings assessed were not required to meet the requirements in ASHRAE 90.1-2007 code but were assessed using the latest standards. At the time, commercial buildings were required to meet standards in ASHRAE 90.1-2004.

Section Two:

Georgia Energy Code

On November 3, 2010, the DCA board of directors voted to give final approval to adopt the 2009 IECC (including Georgia amendments, which mandated blower door testing) as a minimum code and the 2008 National Green Building Standard (NGBS) as a permissive code. This followed the July 29, 2010, recommendation of the State Codes Advisory Committee (SCAC) to approve the codes. The codes became effective January 1, 2011.

Further, DCA adopted enhancements such as mandatory whole-house and duct leakage testing, and other improvements such as the development and implementation of a training and certification program for these tests and the professionals who will administer them. DCA later issued a waiver to delay the enforcement of the testing provisions required by Section 402.4.2.1 and Section 403.2.2 of the 2011 Georgia State Energy Code Supplements and Amendments until July 1, 2011.

Below is a summary of the Georgia-specific residential amendments/enhancements to the 2009 IECC. Georgia has:

- Removed the visual inspection option from the code, effectively requiring blower door testing of the envelope for single-family homes;
- Specified testing protocols and clarified who can conduct the envelope and duct pressurization tests [Duct and Envelope Testing (DET) Verifiers];
- Required mastic on all ductwork and banned the use of building cavities as return ducts;
- Increased the required insulation levels in attic knee walls and clarified insulation levels for attic access;
- Increased the stringency of the window requirements so that the windows' solar heat gain coefficient (SHGC) is consistent statewide;
- Increased the stringency of the U-factor for windows for climate zone two so that it matches climate zone three;
- Developed a series of graphics to illustrate the air-sealing and insulation requirements;
- Established minimum insulation thresholds for those builders who choose to use REScheck for simple trade-offs in demonstrating code compliance;
- Eliminated the use of grid-tied power attic ventilators (except for solar-powered fans); and
- Required additional information on the compliance certificate, which must be posted on the electrical panel box or air handler.

Georgia begins review on new codes for adoption when those new codes are available at the national level, and adoption is practical. DCA is currently starting the committee review process to consider adopting the 2012 International Residential Code (IRC) and the 2012 International Building Code (IBC).

Sample Compliance Certificate

In order to improve compliance across the state, DCA adopted a residential compliance certificate that integrates energy code compliance across the plan review and inspection process and includes all the pertinent information required by the new energy codes. A copy of this compliance certificate can be found in Appendix C of this report. A two-page fact sheet that explains the certificate and its application is available on Southface's website at: http://www.southface.org/learning-center/library/georgia-energy-code-resources.

Section Three:

Selection of Jurisdictions

The project team sought to provide a view into the local code inspection process, paying special attention to areas of improvement and processes that could be easily replicated across the state. The criteria for choosing building department case studies was shaped by a project steering committee composed of industry, utility, and government stakeholders. Criteria included historic enforcement of the energy code, construction in both commercial and residential sectors, and role as a regional hub. The steering committee selected case studies based on the above criteria and through interviews with select building departments, who were notified of the opportunity to participate in the compliance evaluation study.

As case studies, the project team chose two jurisdictions whose scale was representative of the state's predominant units of government: mid-sized cities, counties, and rural areas. Using these criteria, the steering committee selected Chatham County and its largest city, Savannah, as case studies. In addition to possessing long-standing code enforcement infrastructure, these jurisdictions have seen robust growth in recent years, allowing officials to develop inspection methods that respond to energy code requirements across a range of residential and commercial building types.

By describing the plan review and inspections processes of these two jurisdictions, this paper aims to provide best practices and highlight suggestions for improvements that can benefit these departments and the enforcement efforts of building departments statewide. To this end, code enforcement efforts are both described in these sections and represented graphically through plan review and code enforcement diagrams for both Savannah and Chatham.

Section Four:
City of Savannah

Savannah, Georgia, has enjoyed ongoing growth in recent decades, and fostered a strong local building inspections department. Although the city only registered a 3.6 percent increase in population over the decade from 2000 to 2010, the larger U.S. Census-designated region (Bryan, Chatham, and Effingham Counties) has boomed over that time, growing 18.6 percent to 347,000 in 2010. The economy, which depends largely on tourism and the nation's sixth largest port, has been slowed by the recession, but has kept code departments busy with commercial and residential inspection efforts.

Savannah's building code enforcement infrastructure is housed within its Development Services Department, in addition to its inspections, facilitates permitting, engineering and zoning administration. The department prides itself on its service orientation, a fast turnaround in planning and inspection efforts, and its role as a resource to the building and development community. Like many jurisdictions statewide, the department is currently in a transition to enforcing additional requirements in the state's new code, 2011 Georgia State Energy Code, which is based on the 2009 IECC. For projects that were permitted before code adoption, the older code is applicable. Newer projects are proceeding through plan review and inspection under the new energy code provisions, and as such the department has only recently developed its procedures for enforcing the new testing requirements, specifically the whole house air leakage or "blower door" test and the duct pressure test.

Residential Plan Review Process

For a typical project, the applicant (usually a homebuilder or their designated architect) will meet informally with department staff to discuss the project's possible challenges and submittal requirements. Submittal materials include building plans prepared (usually—but not required to be—stamped by a licensed design professional) to the department along with required forms, plan review fees, and Manual J report, which demonstrates code compliance of the HVAC sizing. For projects electing the trade-off path, the applicant must also submit a REScheck report. After receiving these materials, the clerk records the permit request in the department's tracking software, Energov. At this point, the department sets a goal of completing review within no more than five business days from this date, although non-compliance problems may delay turnaround.

Plans are reviewed in sequence for compliance with flood and zoning requirements, and finally for building requirements. For residential projects, building plans examiners review not only building and energy code related content, but the plumbing, electrical, and mechanical portions of the residential code as well. The majority of applicants follow the prescriptive code compliance path, so code officials will confirm compliance with prescriptive requirements and crosscheck the plans against the IECC. For projects that use tradeoffs to meet the code, the REScheck report is a necessary part of the submission. Savannah employs an all-inclusive or "single" permit application form in place of individual permits traditionally used for each trade. Once building approval and sign offs are recorded into the department's tracking software, then plans are sent to a permit clerk for processing. The permit clerk then calculates the permit fees, contacts the applicant and issues the building permit. Because subcontractors are not listed on the building permit application, they must submit their "sub permits" and any other additional information separately once they are identified by the main permit applicant. One example of this is in the submission of the Manual J report needed to meet mechanical requirements. This report verifies equipment specifications and

sizing by comparing the report to the mechanical and energy codes. Actual plan inspection time for all reviews is usually less than one hour for single-family projects.

For plans that show noncompliance, results are recorded in Energov and the reviewer calls the applicant to request resubmittal, clarification or more information. In most cases, the designer corrects sheets with identified problems and resubmits them for insertion into the plans for re-review. Larger problems may require resubmittal of all plans. Additionally, Savannah utilizes a "Master Set" plan process designed to speed up review for larg-volume builders who build multiple houses from the same plans.

Commercial Plan Review

Savannah's commercial plan review process is similar to the residential plan review. A pre-permit meeting between the department and the applicant (or the designated design professional) usually occurs before submittal, and allows the applicant an opportunity to address potential challenges and required submittal materials. After the applicant is ready to proceed, they submit building plans to the clerk, along with a COMcheck report if the applicant elects the tradeoff path in ASHRAE Standard 90.1. The majority of projects follow the prescriptive compliance path, and COMcheck is not used. In Savannah, plan reviewers examine plans for prescriptive code compliance or examine tradeoffs to confirm modeling specifications on tradeoffs allowed by COMcheck.

The plan review follows the same process used for residential products, and the department likewise aims to turn around small commercial projects in fewer than 10 days, although more complicated projects can take up to 30 days for review. The commercial process includes flood, zoning, building and trade reviews, although it differs from residential plan review in that plan reviewers use COMcheck instead of REScheck to document compliance when using tradeoffs. For restaurants, the health department is notified of the plans and performs their own independent review and inspection.

Residential Inspection Process

After a permit is issued, contractors call the department to schedule inspections for the work that has been completed. For typical residential projects, inspections are conducted in the following order: slab/foundation, framing, nail pattern/sheathing, mechanical, plumbing, electrical rough-ins, insulation, drywall, mechanical, plumbing, electrical finals, and an overall building final inspection.

During construction, each job site is required to keep the approved plans on-site to allow inspectors to compare installed work to plan specifications. Unlike Chatham County, Savannah inspectors conducting electrical, plumbing, and mechanical inspections are specialized in one area rather than cross-trained to perform all three trade inspections; however, each trade inspector can inspect both commercial and residential buildings. This specialization is possible because of the larger permit volume in the city compared to the unincorporated county.

According to inspectors, the most common energy code violations in residential buildings are insufficient air sealing around penetrations in the building envelope, and poorly installed and dislodged insulation. Construction progress is slowed because contractors cannot move to the next step of the process until reinspection occurs. Additionally, noncompliance results in a $50 reinspection fee for the first offense and $100 for a subsequent reinspection. Failure of an inspection is noted in the department's tracking software. Most inspections for single-family homes last no more than 30 minutes. No checklists are used on-site although the contractor (if on-site) is notified of the result. In reference to new testing requirements, the department thus far does not plan to keep a copy of the compliance certificate or blower door certificate.

This attic hatch is insulated and weather-stripped. Thanks to the Marwin Company for sample.

Energy code provisions are confirmed throughout the inspection process. While code departments in zones three and four would begin the process of enforcing the energy code with the foundation inspection, Georgia's climate zone two does not require foundation insulation. Thus, in Savannah, the first inspection for the energy code is the framing inspection, which allows inspectors an opportunity to inspect for sealing of the building envelope (which can be sealed around windows and doors by framing crews). Window National Fenestration Rating Council (NFRC) labels are also checked for the U factor SHGC, and design pressures. Glazing is also checked for impact resistance or protection requirements as Savannah is located in a coastal high-wind region.

The framing inspection also allows contractors a chance to assess the insulation and air sealing behind showers and baths. This is important because in most new homes prefabricated bath and shower units are installed before the insulation contractors install insulation throughout the house. To meet this challenge, the department has worked with contractors to ensure that insulation and air barriers are installed prior to the installation of showers and tubs—usually by the framing contractors. The framing inspection also allows the inspector an opportunity to verify the sealing of the bottom wall plates throughout the house.

Trade rough-in inspections also provide an opportunity to check for energy code compliance. During the mechanical rough-in, inspectors confirm that duct work is properly installed and sealed. For homes with ducts in unconditioned space, it is at this point that the inspector also checks the contractors report on duct leakage test results. Duct leakage tests are not required where all ducts and air handling equipment are located inside the building envelope. By insulating the roof line (underside of roof decking) with spray foam insulation and locating ducts and HVAC equipment in the attic (inside the thermal envelope), many builders in Savannah avoid the duct leakage test requirement. The electrical rough-in likewise provides inspectors an opportunity to confirm that the lighting fixture installation meets the specifications provided in the building plan.

Blown-in cellulose is inspected during the insulation inspection of a multifamily building in Savannah. The NFRC sticker and air sealing around the window were inspected.

The stand-alone insulation inspection is a crucial inspection for energy code compliance, as it provides an opportunity to confirm that insulation is installed properly and that all penetrations in the building envelope are sealed. In practice, the majority of new homes are insulated with fiberglass batts in exterior walls, often supplemented by spray-foam insulation on band joists and in wall cavities containing complicated plumbing or exterior penetrations. Attic ceilings are commonly insulated with spray foam as well, which eliminates the need for duct blaster testing since HVAC equipment and ducts are often located in the attic. Throughout the house, penetrations in stud wall top and bottom plates cut for electrical and plumbing runs are checked for foam sealing. During the insulation inspection the contractor provides the inspector with a report indicating passage of the whole-house pressure test (blower door test). The test can be performed after this step, but conducting it immediately after insulation and air sealing (and before drywall installation) allows contractors to fix any problems easily.

Systems inspections also allow inspectors to confirm a variety of energy code requirements. During the mechanical final, inspectors confirm that HVAC equipment meets the requirements specified in the plan. The building final inspection allows inspectors an opportunity to confirm that a compliance certificate is placed in the panel box along with forms indicating passage of applicable tests. The final inspection also allows the inspector to check that at least 50 percent of all hard-wired fixtures have high-efficiency bulbs, which are usually compact fluorescents (CFLs).

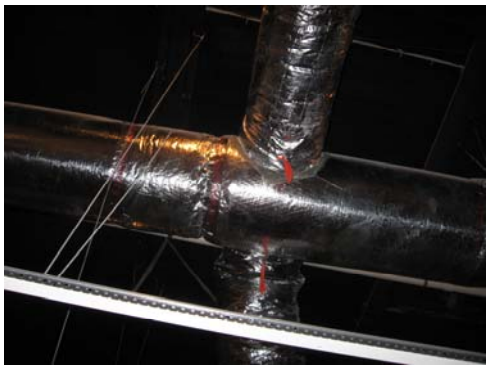
New additions to existing buildings are subject to the code and new components (such as windows) must meet the code as well. The department stipulates that when building systems are repaired, all new equipment must meet the latest code, but non-code compliant, still-functioning components do not have to be replaced unless total changes are greater than 50 percent of the system's value.[5]

Commercial Inspection Process

The procedures for commercial inspection are similar to the residential inspection, although inspectors must review a greater variety of buildings, including small-scale commercial, office, institutional buildings, and multifamily residential, among others. As with residential projects, applicants are required to keep approved building plans on site. These are especially helpful during commercial inspections, as these projects are more complicated than their residential counterpart. Steps for commercial inspections are similar to those used in the residential inspection process, although additional firewall inspections are needed due to more complex framing, drywall and screw pattern

[5] The 50 percent rule is a state amendment to section 3403.1 of the International Building Code. The state amendment specifically reads that "When the estimated cost of the new work is equal to or greater than fifty percent (50 percent) of the replacement cost of the existing system or building, the entire system or building shall be made to conform to the requirements of the state Minimum Standard Codes for new construction."

configurations. Insulation and mechanical inspections are crucial for energy code compliance, just as with residential inspections, as code inspectors are able to verify prescriptive building attributes, envelope sealing, and proper HVAC and other equipment specifications and installation. Additionally, the electrical inspection provides inspectors an opportunity to confirm that lighting stays within the lighting power density requirements of the code.



Proper sealing of duct work in a Savannah commercial building helps minimize air leakage.

Building Plan Review and Inspection Process

Energy Code Requirements, City of Savannah, Georgia

- Before submittal of materials, applicant may have a pre-permit meeting with staff to discuss project and required submittal materials

1 Applicant submits permit application, building plans, contractor and subcontractor state certifications, RES*check*/COM*check* reports if applicable (for residential and commercial buildings, respectively), Manual J, and fee for plan review.

2 Clerk receives submittal and enters information in department's tracking software. Permit application is put in queue for plan review by building official in tandem with other departments.

3 **Zoning and Engineering Reviews**
Flood and zoning reviews, in sequence.

4 **Building Plan Review**
Reviews building plan for compliance, using Plan Review Cycle:

5 **Building Trade Review**
Plumbing, mechanical, and electrical reviews in sequence, using Plan Review Cycle:

PLAN REVIEW CYCLE

A **PRESCRIPTIVE PATH**
Building plans are reviewed and compared to IECC prescriptive code requirements.

OR

B **TRADE-OFF PATH**
Building plans are reviewed and compared to RES*check* or COM*check*.

Problem with plans? Responsible staff member calls applicant for re-submittal of corrected construction drawings.

Building plans meet all code requirements.

4 **Plan Review Conclusion**
After any problems are corrected by applicant, the reviewer signs and dates plans and passes the approved copy to the permit clerk.

5 **Permit Issued**
The permit clerk calculates anticipated inspection fees (based on project valuation) and issues building permits to applicant upon payment.

Building Inspection Process

Energy Code Requirements, City of Savannah, Georgia

denotes additional best practice

- Each inspection is initiated by applicant or contractor calling the department to schedule inspection
- Inspections are scheduled by the permit clerk, usually within 24 hours
- Approved plans are always required to be on site for use by inspectors
- Non-compliance results in a failed inspection and required re-inspection as soon as problems are corrected
- Inspectors return to the office every afternoon to enter results from day's inspections into computer
- Inspections would be enhanced by the use of an energy code checklist

1 **Foundation Inspection**
In other climate zones, inspectors would check for foundation insulation.

2 **Framing and Sheathing Inspections**
Inspectors check window SHGC and u-factor requirements. Inspectors also check air sealing throughout house and insulation & air barrier behind eventual bath and shower installations.[a]

[a] This is important because plumbing rough-in of bath and shower enclosures occurs prior to house-wide insulation installation. Many framing crews carry small amounts of insulation for install in these areas in advance of inspection.

3 **Plumbing, Mechanical, Electrical Rough-Ins**

Plumbing: Checks sealing at penetrations.

Mechanical: Assesses proper sealing of duct work.

Electrical: Checks installation against plans for compliance with light power density.

4 **Insulation Inspection**
Checks for proper installation of fiberglass batts and spray foam, if applicable. Confirms caulk or foam sealing of:

1. exterior penetrations, and
2. holes drilled in stud wall top and bottom plates.

4A **COMMERCIAL BUILDINGS**
Additional firewall inspections are required.

5 **Drywall Inspection**
Inspector checks for continuous air barrier and insulated, weather-stripped attic hatch.

6 **Plumbing, Mechanical, and Electrical Finals**
Inspector checks HVAC equipment against plan.

7 **Building Final Inspection**
Inspector confirms 2009 IECC compliance certificate is posted in panel box along with forms indicating passage of all applicable tests.[b]
Compact fluorescents must be present in 50 percent of hard-wired fixtures.

[b] Duct work must pass pressure testing to minimize leakage. Testing can be completed at the final inspection.
Note: if ducts are brought into the building envelope, such as by insulating the attic ceiling instead of the attic floor, this test can be avoided.
Builders must also pass a whole-house air leakage test. This test should also be performed at final inspection after drywall is up and all penetrations are sealed.

Section Five:
Chatham County

The second case study selected was Chatham County's Department of Building Safety and Regulatory Services, which manages code enforcement for all unincorporated areas of the county. In addition to the nearly 26 square miles of land area falling under their jurisdiction, the county's code enforcement infrastructure has been retained by other incorporated jurisdictions within the county to handle their plan review and inspection activities. These areas include the City of Tybee Island, as well as the smaller towns of Thunderbolt and Vernonberg.

Although permit activity for new single family homes declined during the real estate downturn, the county has seen ongoing renovation of single-family homes and institutional commercial developments. As a result of the department's small size, plan review—inclusive of building plan review and trade reviews—is reviewed by one official for residential projects. Commercial plan reviews, however, are sent to specialty trade reviewers, as in Savannah. Similarly, inspections are made more efficient by cross-training inspectors in all areas of the code, so that they can review plumbing, electrical, and mechanical systems for both residential and commercial buildings, in addition to general building inspections. Cross-training inspectors is crucial for minimizing travel time of inspectors, who may have to drive long distances between inspection sites. This challenge is also addressed by letting inspectors take their work trucks home at night, a perk that also allows them to conduct morning inspections near home before setting foot in the office—thus saving time and gas. Each inspector also uses a two-way radio to communicate with the office from the field.

Like neighboring Savannah, the department has a strong orientation to customer service and tailors its efforts to respond to its rural setting. This commitment to customer service is exemplified by the county's website, accessible at http://buildingsafety.chathamcounty.org, which is intuitive and features a user-friendly layout. On the site, applicants can track their permits, and choose one of numerous hyperlinked applications from conventional permits to smaller, do-it-yourself and home-renovation issues that affect existing housing stock. The county's department is also similar to Savannah's in that it also houses other functions within one department, including the county's zoning administration and licensing divisions, which minimizes the strain for applicants and offers other revenue streams, which to some extent buffer changes in fees from permit activity. Unlike Savannah, Chatham's Permits and Inspection Division is an enterprise fund, meaning it must raise its operating funds from plan review and inspection fees, rather than relying on the general fund.

Like Savannah and many other jurisdictions statewide, the department is currently in a transition to enforcing additional requirements in the state's new code, the 2009 IECC plus Georgia Amendments. For some newer projects, the latest energy code provisions are applicable, including the duct pressure test and whole house air leakage or "blower door" test.

Residential Plan Review Process

For the typical project, the applicant will meet choose to meet informally (as this meeting is not required) with department staff to discuss the project's possible challenges and submittal requirements. When the applicant is ready to proceed, they submit the permit application, building plans, a non-refundable plan review fee, the contractor and subcontractors' state certifications, along with REScheck and Manual J reports (demonstrating code compliance and proper HVAC sizing, respectively). For smaller projects or renovations, this documentation may not be required,

although all new work will have to meet the latest code. The permit clerk enters these documents into the department's computer system and the application materials are put into the queue for simultaneous review by the building official and other division staff.

Unlike neighboring Savannah, plans are reviewed in tandem by zoning staff at the same time they are being examined for compliance with current construction codes. The zoning division examines compliance with underlying zoning while the engineering staff reviews soil erosion standards, the tree ordinance, water and sewer. Septic connections, by contrast, are reviewed by the county's Health Department. If the project will connect to Savannah's municipal water or sewer systems, the county coordinates with its counterpart at the city. All results are entered into the department's computer system.

At the same time, the building plans are reviewed by the assistant director of the department, who reviews the plans for compliance with all applicable codes, including trades. Plans are checked for compliance with the energy code and are also compared to REScheck reports, which must certify a "passing" result. During trade review process, the electrical plan review examines allowable power densities and specified fixtures. Mechanical review confirms equipment specifications and sizing by crosschecking the Manual J report. The department tries to complete plan review within 24 hours, although noncompliance can slow this process.

For plans that show noncompliance, the reviewer sends comments to the applicant. For minor changes, the designer corrects sheets with identified problems and resubmits them for insertion into the plans for re-review. After successful review, the plan reviewer stamps the plans and records the result in the department's computer system. The permit clerk then calculates permit fees based on suggested International Code Council (ICC) rates, calls the applicant, and issues a building permit.

Commercial Plan Review

Chatham County's commercial plan review process is similar to the residential plan review. As with residential buildings, after a voluntary pre-permit meeting, the applicant submits plans, along with a required COMcheck report. The zoning and building plan review occur simultaneously. For small projects, review can occur in as little as 24 hours, although larger projects may take additional time. Department staff estimate that approximately 85 percent of commercial projects follow the prescriptive path. In this instance, the reviewer examines plans for compliance with prescriptive code requirements. In addition to reviewing the plans, the reviewer uses COMcheck to document compliance. For commercial projects attempting tradeoffs, the COMcheck report is also used and is checked against plans. In the event the applicant intends to use new or innovative materials or technology, its performance must also be accompanied by documentation.

Residential Inspection Process

After a permit is received, contractors call the inspection department to schedule inspections for each required review, which is usually scheduled within 24 hours. For typical residential projects, inspections are conducted in the following order: foundation; mechanical, plumbing and electrical rough-ins; framing and sheathing; insulation; drywall; mechanical, plumbing and electrical finals; and an overall building final inspection.

As in Savannah, during construction each job site is required to maintain current approved plans on-site to allow inspectors to compare installed work to plan specifications. Unlike Savannah, inspectors are cross-trained in all major codes, allowing them to inspect all sites. According to inspectors, the most common violations are non-compliant windows installed during renovation projects, which is often attributable to older stock at building supply stores.

Improper sealing of the exterior envelope and incorrect mechanical equipment also occur. On site, inspectors do not use a checklist, but record non-compliant issues—along with a citation from the applicable code book—on a form that is given to the contractor. A copy of this report is kept in the Department's records and provides legal protection should a contractor later accuse inspectors of failing to locate compliance shortfalls. Stop orders are rarely issued, but re-inspection is required after failed inspections. For homes permitted after the passage of the new energy code, inspectors review reports that confirm the home passed a blower door test and duct pressure test. Before a certificate of occupancy is issued, inspectors must also make sure that the energy code compliance certificate is placed in the panel box or other allowable area and signed.

Sealing of framing and wall top plate can be seen on a new home under construction in Chatham County.

Energy code provisions are confirmed throughout the inspection process. The first crucial inspection for the energy code is the framing inspection, which allows inspectors an opportunity to inspect for sealing of the building envelope, which is sealed around windows and doors by framing crews. Window NFRC labels are checked for U and SHGC factors, as well as impact resistance requirements. Said one Chatham code official, "because of [the threat of] hurricanes, windows are a big deal around here."

The framing inspection also allows contractors a chance to assess the insulation and air sealing behind showers and baths. This is important because in most new homes the plumbing rough-in occurs before the insulation contractors install insulation throughout the house. To meet this challenge, the department has worked with contractors to ensure that insulation and air sealing is completed prior to the installation of showers and tubs—usually by the framing contractors.

Trade rough-in inspections also provide an opportunity to check for energy code compliance. During the mechanical rough-in, inspectors confirm that duct work is properly installed and sealed. For homes with ducts in unconditioned space, it is at this point that the inspector also checks the contractors report on duct leakage test results. Many builders in Chatham avoid this test by insulating the attic ceiling (roof) with spray foam insulation in lieu of the attic floor, thus bringing the ducts into the building envelope. The electrical rough-in likewise provides inspectors an opportunity to confirm that the lighting fixture installation meets the specifications provided in the building plan.

The stand-alone insulation inspection is one of the most crucial steps to ensure energy code compliance, as it provides an opportunity to confirm that insulation is installed properly, and that all penetrations in the building envelope are sealed. This inspection only takes 15 to 20 minutes to complete, barring major problems. In practice, the majority of new homes are insulated with fiberglass batts in exterior walls, often supplemented by spray-foam insulation on band joists and in wall cavities containing complicated plumbing. Attics ceilings are commonly insulated with spray foam as well, which eliminates the need for duct blaster testing. Throughout the house, penetrations in stud wall top and bottom plates cut for electrical and plumbing runs are checked for foam sealing. During this inspection, the contractor provides the inspector with a report indicating passage of the whole-house pressure test. The test can be performed after this step, but conducting it immediately after insulation and air sealing

The laundry room wall of this new Chatham County home is sealed with fiberglass batt and spray foam insulation.

(but before drywall installation) allows contractors to fix any problems easily should the home not pass the pressure test.

Subsequent inspections also allow inspectors to confirm a variety of energy code requirements. During the mechanical final, inspectors confirm that HVAC equipment meets the requirements specified in the plan. The building final inspection allows inspectors an opportunity to confirm that a compliance certificate is placed in the panel box along with forms indicating passage of applicable tests. The department keeps a copy of the final inspection report and requires the compliance certificate to be submitted to the department before they issue the final certificate of occupancy. The final inspection also allows the inspector to check that at least 50 percent of all hard-wired fixtures have high-efficiency bulbs, which are usually CFLs.

The inspection process also includes enforcement of code requirements for renovations of existing buildings. For additions or alterations of specific building components, those renovations would be subject to the code. For instance, a new addition to a home will require prescriptive requirements from the 2009 IECC for the building envelope. Window replacement would also require the latest code compliant windows. Like Savannah, when building systems are updated, the department follows the 50 percent rule, which stipulates that when building systems are repaired, all new equipment must meet the latest code, but non-code compliant, still-functioning components do not have to be replaced unless total changes are greater than 50 percent of the system's value. For homeowners completing their own renovations, the department allows them to bypass the contractor certification requirements for professionals as long as they sign a homeowner affidavit and schedule all necessary inspections.

Commercial Inspection Process

The commercial inspection follows the sequence established for residential buildings. Inspections often take significantly more time, however, and can last up to an hour depending on project size. Applicants are required to keep approved building plans on-site. Insulation and mechanical inspections are crucial for energy code compliance, just as with residential inspections, as code inspectors are able to verify building envelope attributes, air sealing, and proper HVAC and other equipment specifications and installation. Additionally, the electrical inspection provides inspectors an opportunity to confirm that lighting stays within the lighting power density ceilings in the code. Stop orders are rare, but compliance does require a later re-inspection, which slows work and is a de facto penalty for non-compliance. Improper mechanical equipment is sometimes the source of non-compliance, but this issue has diminished through efforts to educate equipment suppliers.

Building Plan Review and Inspection Process

Energy Code Requirements, Chatham County, Georgia

- Before submittal of materials, applicant may have a pre-permit meeting with staff to discuss project and required submittal materials

1 Applicant submits permit application, building plans, contractor and subcontractor state certifications, RES*check*/COM*check* reports (for residential and commercial buildings, respectively), Manual J, and fee for plan review.

2 Clerk receives submittal and enters information in department's tracking software. Permit application is put in queue for plan review by building official in tandem with other departments.

3 Building Review

Building plan and systems reviewed by single official.

A PRESCRIPTIVE PATH

Building plans are reviewed and compared to prescriptive code requirements.

Plans are checked against RES*check* or COM*check* report submitted by applicant.

OR

B TRADE-OFF PATH

Building plans are reviewed and compared to RES*check* or COM*check*.

Problem with plans? Responsible staff member calls applicant for re-submittal of corrected construction drawings.

Building plans meet all code requirements.

Other Reviews in Tandem

Engineering Department

Checks soil erosion plan and water/sewer/septic connections. The county may coordinate this review with the city of Savannah if the applicant plans a connection to municipal water or sewer.

Zoning Staff

Checks compliance with zoning laws.

4 Plan Review Conclusion

After any problems corrected by applicant, the reviewer stamps the plans as approved and passes them to the permit clerk.

5 Permit Issued

The permit clerk calculates anticipated inspection fees (based on building valuation) and issues building permits to applicant upon payment.

Building Inspection Process

Energy Code Requirements, Chatham County, Georgia

denotes additional best practice

- Each inspection is initiated by applicant or contractor calling the department to schedule inspection
- Inspections are scheduled by the permit clerk, usually within 24 hours
- Approved plans are always required to be on site for use by inspectors
- Non-compliance results in a failed inspection and required re-inspection as soon as problems are corrected
- Inspectors return to the office every afternoon to enter results from day's inspections into computer
- Inspections would be enhanced by the use of an energy code checklist

1 Foundation Inspection

In other climate zones, inspectors would check for foundation insulation.

2 Framing and Sheathing Inspections

Inspectors check window SHGC and u-factor requirements. Inspectors also check air sealing throughout house and insulation & air barrier behind eventual bath and shower installations.[a]

[a] This is important because plumbing rough-in of bath and shower enclosures occurs prior to house-wide insulation installation. Many framing crews carry small amounts of insulation for install in these areas in advance of inspection.

3 Plumbing, Mechanical, Electrical Rough-Ins

Electrical: Checks installation against plans for compliance with light power density.

Mechanical: Assesses proper sealing of duct work.

4 Insulation Inspection

Checks for proper installation of fiberglass batts and spray foam, if applicable. Confirms caulk or foam sealing of:

1. exterior penetrations, and
2. holes drilled in stud wall top and bottom plates.

4A COMMERCIAL BUILDINGS

Additional firewall inspections are required.

5 Drywall Inspection

Inspector checks for continuous air barrier and insulated, weather-stripped attic hatch.

6 Plumbing, Mechanical, and Electrical Finals

Inspector checks HVAC equipment against plan.

7 Building Final Inspection

Inspector confirms 2009 IECC compliance certificate is posted in panel box along with forms indicating passage of all applicable tests.[b]

Compact fluorescents must be present in 50 percent of hard-wired fixtures.

[b] Duct work must pass pressure testing to minimize leakage. Testing can be completed at the final inspection.
Note: if ducts are brought into the building envelope, such as by insulating the attic ceiling instead of the attic floor, this test can be avoided.

Builders must also pass a whole-house air leakage test. This test should also be performed at final inspection after drywall is up and all penetrations are sealed.

Section Six:
Best Practices from Plan Review and Inspection Processes

Savannah and Chatham County provide many best practices that could be replicated by jurisdictions across the state. Additional efforts would further improve their plan review and inspection efforts and serve as a model for jurisdictions statewide. A summary of actual and recommended best practices for plan review and inspection is below.

Training: Both Savannah and Chatham County display a commitment to ongoing training for their inspectors, who are all certified with the International Code Council (ICC). In Savannah, inspectors are required to receive 18 continuing education units (CEUs) every year, which is supported and funded by the city. In Chatham County, the need for training is also recognized as important for inspectors, who are cross-certified and thus have knowledge of multiple areas of the code, including the IECC. Chatham County also pays for classes through the department's budget. In the county, when one staff member (usually the assistant director) is able to attend a specialty training event without other inspectors present, he in turn presents a summary of lessons learned to all inspectors upon return. Additional training best practices are provided in the Training Assessment on page 27.

Education and Outreach: A commitment to education of the construction community and homeowners is also a common thread in the two departments. In Savannah, the department holds biannual 'Permitting 101' classes at the local convention center to explain the permitting process and any recent changes to interested parties. The department also holds a biannual 'Homeowners Night,' which allows local residents a chance to learn how the code might apply to work on their homes. The city provides flyers to building suppliers in advance of code changes to educate their staff and contractors. Chatham County takes similar actions by creating hand-outs and inviting construction professionals to the department every year to for a meeting to review the code in person. Outreach and education is also done at the local home builders association chapter's conference, where the county books a booth to distribute materials. Chatham County and Savannah also offer websites with easy-to-use hyperlinks corresponding to code requirements. Both departments—through their commitment to offering a customer-service oriented department—strive to treat failed plan reviews and inspections as educational opportunities.

Use of REScheck and COMcheck: Both departments require REScheck and COMcheck reports to be submitted along with building plans to demonstrate building energy code compliance for projects following the performance path using tradeoffs. These programs, easy to use and available for free download from DOE at www.energycodes.gov, verify projects are designed to be in compliance with the energy code. A report from the program certifying a "passing" result is available to plan reviewers and allows them to cross-check details on the actual plan for accuracy. Use of the programs also allows design professionals and contractors to build and maintain their literacy of the code.

Service Orientation: Both departments express a positive disposition towards construction professionals. In addition to offering efficient and speedy plan review and inspections, the approval process is housed under one roof in both jurisdictions, which lowers transactional costs for time-conscious applicants. The disposition of code inspectors in the field is also positive and solutions-oriented; code non-compliance is treated as an educational opportunity. By catching problems, inspectors are regarded as quality control. Said one local code official, "we're the punch list." In

Chatham County, contractors are also able to use the department's website or phone to check on the status of permits. Savannah also provides customers the ability to track permits online.[6]

Inspection Process: Both departments examine energy code provisions throughout multiple steps in the inspection process. Additionally, both departments conduct a stand-alone insulation inspection, which is often not performed by other departments throughout the state. This inspection allows the department to ensure that insulation in the walls is properly installed. Gaps and compressed areas of wall insulation, often seen in fiberglass batt insulation, can cut the energy saving potential of insulation by more than 25 percent. Poor installation also leads to condensation and comfort problems. The insulation inspection is critical in ensuring builders do not cut corners when installing insulation. In addition to the insulation inspection, the framing, mechanical, electrical, plumbing and final inspections are all used to check for energy code provisions.

Required Submittal of Load Calculations (Manual J): HVAC load calculations are important to ensure a system is not oversized. Both departments require that load calculations be submitted prior to issuance of the building permit.

Required Submittal of Compliance Certificate: Chatham County, like many building departments throughout Georgia, requires that the energy code compliance certificate be submitted to the building department before a certificate of occupancy is awarded.

Loaning Inspectors: Chatham County's example of loaning inspectors to small jurisdictions (in return for the same fees charged in unincorporated county areas) is an example of how rural counties and low-population towns statewide can ensure new construction and major renovations meet the energy code.

Flexibility: The flexibility of Chatham County's inspection process and staff roles provides another example of how low population density counties can provide efficient code inspection. While some larger jurisdictions utilize specialized inspectors, Chatham County's inspectors are cross-certified and thus can inspect through all phases of both commercial and residential construction. This enables inspectors to be utilized on all construction sites throughout the county. The department is also unique in that the assistant director of the department doubles as the full-time plan reviewer and—if the department is backed up—as another inspector. Chatham County also minimizes the time inspectors spend on the road between sites by allowing inspectors to take their trucks home in the evening. Coordination over two-way radios allows them to conduct early-morning inspections near their homes and to stay in touch with the office while in the field.

Suggestions for Improvement

Additional Energy Code Training: Although training is required every year, typically the staff in Savannah and Chatham building departments only receives training on energy code requirements once, soon after a new code becomes effective. Therefore many inspectors are not fully versed in the energy code, such as the requirement that air permeable insulation have substantial contact with an air barrier on all sides of its cavity. Deficiencies of this requirement are often found behind tubs and showers. For example an inspector allowed the use of house wrap as

[6] "Vertical Inspections Permitting System." 20 February 2012. Web. http://www.savannahga.gov/cityweb/pubdev.nsf/122bc2983bf4b4448525764000648610/6d6a89a17631e31e852576400065721b?OpenDocument

an air barrier behind the tub, which was not sealed appropriately to the studs. Additional training, specifically field training, would improve enforcement of this and other more nuanced requirements in the energy code.

Improved Education and Outreach: Savannah and Chatham County do a good job of providing education and outreach to the construction community. However, additional education and outreach could be done. For example, many building departments notify the industry how they intend to enforce the testing requirements and other new provisions in the energy code. Building departments in Augusta[7], Gwinnett County[8] and Cobb County[9] have clearly outlined how they will enforce the new energy code in a letter either posted on its website or sent to the construction industry. Information included in this letter discusses exactly how the department plans on enforcing the testing requirements in the energy code as well as other changes to the code. A few of these letters are included in Appendix E of this report. Other building departments in the state give builders copies of resources that would help improve compliance. These resources include Georgia's residential field guide, a guide that includes detailed descriptions, photos, and graphics of energy code compliance.[10] Other resources include the air-sealing key points appendix of the 2011 Georgia Amendments to the energy code. These resources can be found on the Southface website at www.southface.org/ga-energy-code. Finally, both departments should continue to hold regular meetings with local Home Builder Association chapters to inform them of regular compliance issues.

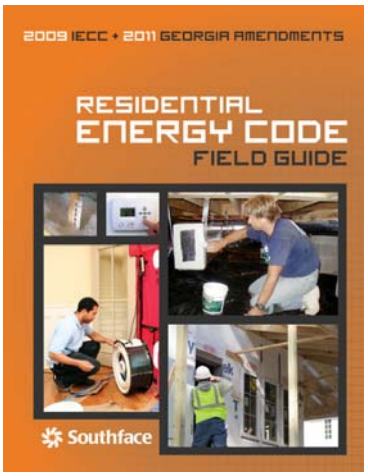
Use of RESCheck and COMcheck: Requiring the submittal of REScheck and COMcheck is an easy way for code departments to ensure that builders meet the requirements in the Georgia energy code. When reviewing REScheck and COMcheck reports, the building departments not only need to ensure that the building passes but that the most recent version of REScheck and COMcheck were used. Previous versions of the software do not include the Georgia Amendments to the code or in the case of COMcheck, if builders choose "Georgia" in the previous version, they simply show compliance with the old version of Georgia's commercial energy code. Therefore, building departments need to ensure that the version of REScheck is version 4.4.2 or later and COMcheck should be version 3.9.0 or later. These versions were released in the fall of 2011. When using the latest version of REScheck, users must choose "Georgia 2011" in the Code pull-down menu so that REScheck accurately reflects Georgia's Amendments. For COMcheck, users must choose "90.1 (2007) Standard" in the Code pull-down menu because Georgia amended the window requirements in the 2009 IECC and there is not a Georgia specific version of COMcheck that reflects those changes.

Careful Review of Load Calculation: Both Savannah and Chatham County require submittal of the load calculation with the permit application. Requiring submittal ensures that the load calculation is performed but it does not ensure that is performed correctly. Studies have shown that the majority of load calculations conducted by contractors have inappropriate inputs and thus HVAC systems are typically oversized.[11] It is recommended that the building departments train their staff on reviewing load calculations and then review specific inputs in the load calculation

[7] Masters, Marshall. "Energy Code Enforcement in Augusta." Telephone interview. 9 Jan. 2012.
[8] "Community Energy Code Enforcement." Letter. *Gwinnett County Government*. Web. 19 Jan. 2012. <http://www.gwinnettcounty.com/static/departments/planning/pdf/esp/community_energy_code_enforcement_policy.pdf>.
[9] "Cobb County DET Testing Requirements." Letter. 1 June 2011. Web. http://comdev.cobbcountyga.gov/documents/EnergyCodeinformationletter.pdf
[10] Available at http://www.southface.org/default-interior/Documents/ga-field-guide-res.pdf
[11] A study conducted in Florida indicates that the majority of HVAC systems are oversized by 20 percent because of incorrect inputs in the Manual J Load Calculation. *See* James, P. Florida Power and Light Company. The Effect of Residential Equipment Capacity on Energy Use, Demand and Run Time. Retrieved from: http://www.fsec.ucf.edu/en/publications/html/FSEC-PF-328-97/.

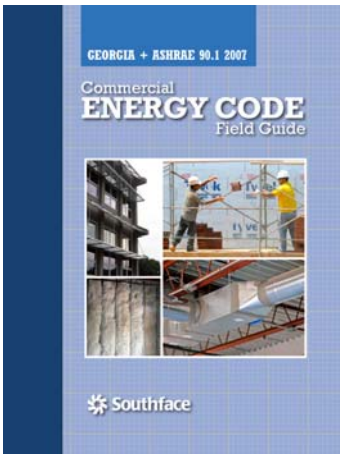
upon submittal (e.g., correct indoor and outdoor design temperatures) to ensure that load calculations are performed correctly. Kennesaw's building department has found this to be a worthwhile endeavor.[12] It would also be beneficial to provide additional training to the design and contractor community to prevent inappropriate inputs that lead to over-sizing

Required Submittal of Duct Designs: The residential code in Georgia requires that duct systems in homes meet certain performance standards. This is an important feature in energy code-compliant homes because poor duct design can negate the performance of energy efficient HVAC systems, which are designed to work optimally with proper duct systems.[13] In fact, new energy efficient equipment installed with outdated duct designs may use more energy than the old inefficient equipment it replaces. Because the HVAC industry may not be prepared to meet this requirement, it is recommended that the building department phase this requirement in slowly to allow the HVAC industry members to educate themselves on proper duct design. The City of Atlanta is currently considering requiring the submittal of duct designs in their permitting and plan review process.



Field Guide to Georgia's Residential Energy Code, by Southface.

Inspection Process: Both Savannah and Chatham County have the opportunity to inspect for every provision of the energy code in the field. However, neither department utilizes checklists to make sure every requirement is met. Checklists are used in every industry where complexity is inherent by compensating for limits of human memory and attention to detail. Checklists ensure accuracy and completeness in carrying out any given task.[14] Buildings are complex systems and energy codes are ever-changing. A checklist, in concert with the Georgia residential and commercial field guide, which has key insulation and air-sealing diagrams, will help plan reviewers and inspectors check whether every single item in Georgia's energy code is met in every building. Many other building departments throughout the state have found increased compliance with the air-sealing provisions in the energy code simply by using the checklist in Appendix A of the 2011 Georgia Amendments.



Field Guide to Georgia's Commercial Energy Code, by Southface.

Because Savannah and Chatham County both require REScheck and COMcheck, both departments can simply require that builders print out the inspection checklist in REScheck and COMcheck. This inspection checklist includes every item in the code and can be used during field inspections to improve compliance. The Georgia commercial field guide, available on Southface's website, was specifically designed to be used in conjunction with the COMcheck printout.[15] A sample REScheck report with checklist is included in Appendix A of this report. For those building departments that have chosen not to require REScheck, a simple checklist is available on Southface's website at www.southface.org/ga-energy-code and in Appendix B of this report.

[12] Rice, Mark. "Energy Code Enforcement in Kennesaw." Telephone interview. 9 Jan. 2012.
[13] Ueno, K. "ECM Motors Better (Or Worse) Than You Think." *Home Energy.* May/June (2010): 34-38.
[14] Gawande, Atul. *The Checklist Manifesto: How to Get Things Right*. New York: Metropolitan, 2010. Print.
[15] Available at http://www.southface.org/default-interior/Documents/ga-field-guide-comm.pdf

Improved Enforcement of Testing Provisions: Savannah and Chatham County currently intend to require reports for duct sealing and whole house pressure testing, but both of these requirements are new. Recommendations on improving enforcing testing provisions are discussed in Section 8 of this report. These recommendations discuss the benefits and drawbacks of who conducts testing required by the code as well as many innovative ideas used throughout Georgia. Specific ideas that may work for Savannah and Chatham County include providing a compliance certificate sticker to builders, required submittal of the energy code compliance certificate prior to issuance of certificate of occupancy, and spot checking of results by inspection staff.

Improving Commercial Roof Insulation during Replacement: In both Chatham County and Savannah, re-roofing requires a building permit. For commercial buildings, roof replacement is an ideal and cost-effective time to bring insulation up to the latest energy code standards. Often, adding insulation is as easy as adding another layer of above deck roof insulation on top of the existing layer before the roof membrane is applied. Practically, however, roofs are one of the most difficult parts of the code to inspect and enforce, as inspectors do not typically travel with ladders of sufficient length to reach commercial rooftops during construction. Additionally, roofers are also not required to be certified by the state, as other subcontractors are. Outreach and education to building owners and roofing companies—which both Savannah and Chatham County have done ably with other contractors—would help improve this area of code compliance for renovations.

Section Seven:
Training

Chatham County and Savannah have recently taken part in the statewide series of energy code training events. Conducted by Southface, these energy code training events included introductory residential and commercial trainings. Southface has also developed a full set of online training videos and other training resources available here: http://www.southface.org/ga-energy-code.

Savannah

Savannah is an excellent example of a jurisdiction with a traditional comprehensive code compliance program, which includes energy codes. The city requires that all inspectors be licensed with the state licensing board for their respective trades, e.g., mechanical inspectors are required to be licensed as unrestricted mechanical contractors. Further, inspectors are required to maintain their trade certifications with 18 annual in-service training hours. Energy code training, while not currently required, could be a desirable addition to this annual training requirement. Currently, there is substantial peer-to-peer training within the department, with supervisors conducting sessions in new materials and code changes with department staff. Savannah code officials indicated that the intention is to include further energy code information and learning opportunities in this manner. Training budgets are constrained at present, and most training is dedicated to certification requirements.

One very important element to the training that Savannah conducts is their outreach to consumer and users of the codes. The department is extremely sensitive to the need to be consumer-centric, and regularly produces educational flyers and other materials that are directed to the department's customers and stakeholders. Similar materials were developed and distributed for the new Georgia energy code. This best practice yields better compliance, as informed users usually help improve the overall enforcement process. Savannah knows and uses this to their advantage.

Best Practices:

Staff Training: All staff received introductory residential and commercial training with a strong basis in building science.

Department Heads Lead and Train: Department leadership receives IECC training and certification and disseminates the knowledge and information throughout the department via in-house training sessions.

Mandatory Training for Trades: Savannah inspectors are required to be licensed in their trades for basic employment with the city, and must maintain that certification with the licensing department.

Mandatory Updating: As part of that mandatory training, Savannah code staff must take 18 hours of in–service training.

Consumer Orientation: Savannah focuses on conducting consumer outreach on new or changing codes and requirements, primarily by developing and distributing informational flyers describing new or upcoming code changes to contractors via building suppliers and annual industry outreach meetings.

Suggestions for Improvement/Expressed Needs for Training:

Training Needs: Savannah expressed the need for additional energy code training and support including:

- Better understanding of energy code impacts on existing buildings, perhaps including a manual outlining common applications and associated training;
- Inclusion of additional training requirements for the energy code by the licensing board for the trades; and requirement all trades be certified as a means to assure all construction trades understand energy code requirements (e.g., roofers are currently not required to be certified);
- Additional training on REScheck and COMcheck. Design professionals are, in general, poorly equipped to design buildings that are compliant with the new energy code, and it is recommended that events with the local chapter of the American Institute of Architects (AIA) and the International Code Council be created;
- Energy efficiency industry resources should be leveraged for training as well, either through building supply houses, or through sponsorship of Building Officials Association of Georgia (BOAG) and AIA chapter educational events; and
- Additional field training should also be considered to enable inspectors to learn about some of the more nuanced air-sealing and insulation installation requirements in the energy code through hands-on activities.

Chatham County

Chatham County is also a good example of a jurisdiction that is doing its best to provided quality code enforcement for its citizens, based in particular on the director's focus on customer service. The code office has done significant outreach to stakeholders in the community, despite a loss of staff due to the drop in construction experienced over the last three years. Even though this activity has been reduced as well, the codes director currently conducts outreach to stakeholders at least once a year, generally in the form of builder and designer training. As a rule, the department invests time educating the public and code users with the understanding that doing so always brings benefit in terms of improved compliance. In addition, the department staffs a booth at the annual homebuilders show and also promotes the code during Building Safety Month.

The county has also experienced a reduction in travel budget for training. While all the staff have benefitted from the Southface/GEFA energy code training, additional training must be attended by the director and assistant director, and then brought back for peer-to-peer training of staff by the directors. While the county makes sure staff is up-to-date on the latest code changes, there are few resources, or incentives for staff to attend ongoing energy code activities, due to the constrained budget.

Best Practices

Consumer Orientation: Chatham County, much like the City of Savannah, focuses on providing a high level of customer service with its outreach on new or changing codes and requirements, primarily by holding builder training and information sessions during the Building Safety Week initiative, as well as at the local home builders association annual show. This builds on the knowledge of an informed stakeholder public, which will result in higher compliance and greater efficiency in enforcement.

Staff Training: Again, in Chatham County as in Savannah, staff received introductory residential and commercial training with a strong basis in building science.

Department Heads Lead and Train: Additional training in energy codes, as in other code subjects, is often limited to the directors in the county who disseminate the knowledge to staff through in-house training sessions. This both deepens the knowledge of the staff, as well as engenders the desire among staff to continue gaining knowledge on various code subjects, including energy.

Suggestions for Improvement/Expressed Needs for Training:

Training Needs: Chatham expressed the need for additional energy code training and support including:

- Better understanding of energy code impacts on existing buildings, perhaps including a manual outlining common applications and associated training.
- Access to a statewide circuit-rider training service was one area that the county thought would be valuable to them and to other jurisdictions in the state. One example of a successful model is Building Codes Assistance Project (BCAP) and ICC's Energy Code Ambassadors Program (ECAP), which selects code officials from statewide ICC chapters who undergo advanced training and certification on the energy code. It might even be possible for such an initiative to put recently unemployed code officials back to work across the state in the form of a roving energy code advisor. For a description of the Ambassadors program see: http://bcap-ocean.org/resource/energy-code-ambassadors-program-ecap.
- Additionally, fully-sponsored training on REScheck and COMcheck, especially as they relate to in-field inspection, would be helpful. County staff emphasized the need for hands-on exercises for both programs.
- As in Savannah, Chatham County staff believed that design professionals were often poorly equipped to design to new energy code requirements, and recommended that cooperative events be coordinated with local professional organizations like the American Institute of Architects (AIA) and the Building Officials Association of Georgia (BOAG).
- County staff also expressed interest in additional training, such as sessions on existing building requirements and complex commercial systems.
- Additional field based training should also be considered as inspectors would be able to learn about some of the more nuanced air-sealing and insulation installation requirements in the energy code in the field through hands-on demonstrations.

Training and Educational Resources

Both jurisdictions cited similar issues in the area of ongoing energy code training. This challenge can be met, initially, with low-cost or no-cost strategies that the code departments can undertake. Budget implications are also estimated for each:

Southface Online Training: Take advantage of Southface online offerings and resources, especially as a refresher on nuances within the code. Southface may seek support to upgrade the online materials to include tests and certifications, as well as new and upgraded training each year. Training is available on Southface's website at their Georgia Energy Code Resources page: http://www.southface.org/learning-center/library/georgia-energy-code-resources.

Budget - $0 – No registration fees or travel, a very cost–effective means to do refresher course or an initial basic training.

ICC training and certification: ICC offers training certification for IECC plan review and site inspection, available for residential and commercial buildings. Consideration might be given to requiring this certification for staff that will be doing energy code enforcement, in addition to their current trade certification.
Budget – ICC charges approximately $2,500 per training session conducted locally and $250 for certification testing. The local jurisdiction may be able to achieve a discount through the local BOAG chapter. The local government could partner with other nearby jurisdictions to obtain this training, or conduct it at a statewide BOAG conference as well.

Code College Site: The Metro Atlanta Inspectors Association (MAIA) co-sponsored a site with BCAP and Building Media Inc. (BMI), called the Georgia Code College Network. The website contains a number of valuable training segments covering many aspects of building science and code issues. Code staff could be assigned to watch segments, and then discuss it over lunch or a break during the work day. Resources are available at the following link: http://www.codecollegenetwork.com/ga/index.html.
Budget - $0 – Videos and other resources are available free of charge.

Ongoing Consumer/User Outreach: The project team recommends that Chatham and Savannah take advantage of the Consumer Outreach materials on the OCEAN website and feature a link to their site: http://bcap-ocean.org/consumers-take-action.
Budget - $0 – Resources are available free of charge.

Technical Colleges: 16 technical colleges throughout the state have been certified to provide training on the Georgia energy code. This includes Altamaha Technical College, Atlanta Technical College, Augusta Technical College, Central Georgia Technical College, Chattahoochee Technical College, Columbus Technical College, Georgia Northwestern Technical College, Gwinnett Technical College, Interactive College of Technology & Interactive Learning Systems, Moultrie Technical College, North Georgia Technical College, Ogeechee Technical College, Sandersville Technical College, Savannah Technical College, Southern Crescent Technical College and Wiregrass Georgia Technical College. These schools may offer on-going energy code training and certification courses.
Budget: varies by school.

Section Eight:

Effective Implementation of DET Verifier Requirements

One of the biggest changes in the Georgia energy code is the new requirement for duct and envelope testing (DET) in the energy code for all single-family homes. The Georgia energy code requires that this testing be conducted by a certified DET verifier. This individual can be a Building Performance Institute (BPI) Building Analyst, a Home Energy Rating System (HERS) rater, a Home Performance with ENERGY STAR contractor or have taken a course approved by DCA. The Georgia energy code does not require that the individual doing the testing be a third-party. The energy code requires that the home test out at less than 7 ACH_{50} and meet at least one of three duct leakage requirements (less than or equal to 12 percent total leakage at final, 8 percent leakage to outside at final, or 6 percent total leakage at rough-in).

Man conducting duct test as required by Georgia energy code.

The results of the test, as well as other pertinent information about the energy code relevant to the house (insulation values, window values, and HVAC load calculations), must be present on a certificate posted on a home's electrical panel box or air handler. A sample certificate is located in the Georgia Amendments and on both DCA's and Southface's website (http://www.dca.state.ga.us/development/constructioncodes/index.asp and www.southface.org/ga-energy-code, respectively) and in Appendix C of this report.

DET Verifier Training

In the fall of 2010, Southface developed a DET verifier course that was approved by DCA. Initially Southface planned on training individuals at the Southeast Weatherization and Energy Efficiency Training (SWEET) center in Atlanta and Georgia Power agreed to conduct deeply discounted DET Verifier trainings throughout the state. Southface also was the recipient of a grant from GEFA to conduct a train-the-trainer program in technical colleges. Through this program, Southface trained 50 technical college instructors representing 16 different technical colleges in Georgia on both the DET Verifier and energy code training for incorporation into their curriculum.

Southface has also provided the DET Verifier training curriculum to 19 businesses approved by DCA to be DET Verifier trainers.

Number of DET Verifiers Statewide

Southface estimates there are at least 1,162 individuals statewide certified to conduct the DET Verifier testing per the energy code as of January 2012. Of these individuals, 431 were trained by Southface, 215 were trained by Georgia Power, and 44 were trained by other DET Verifier Trainers approved by DCA. Approximately 50 are certified HERS raters and 413 are certified BPI Building Analysts. Currently, all trainers are obligated to list the certified individuals on their website. Links to websites of DET Verifiers are located on DCA's website. HBAG may begin listing all DET Verifiers statewide on their website at www.hbag.org.

Equipment Statewide

Man conducting blower door test as required by Georgia energy code.

Equipment to conduct the testing statewide has been a cause of concern for implementation of the DET Verifier requirements. A recent pricelist from the Energy Conservatory shows that a standard blower door costs $2,495 and duct blaster set costs $1,875. Despite their initial upfront costs, the leading manufacturers of blower door equipment (Retrotec and Energy Conservatory), estimate there have been at least 440 blower door sets sold to individuals in Georgia. In addition DCA has purchased 30 blower doors and duct blaster sets to be rented throughout the state by local HBA chapters for those individuals or building departments who do not have the capital to purchase the equipment upfront. Each local HBA expects to lease the equipment for $100 a day or $150 for two days. For more information about the equipment rental program, visit http://www.hbag.org/page.asp?pg=eqiuipment_assistance_locations&menu=289 .

Who Can Conduct the Test

The Georgia energy code states that anyone can conduct the DET Verifier testing requirements as long as they are trained and certified to do so. Savannah and Chatham County, like the majority of building departments, have chosen not to modify this requirement for their jurisdictions. However, because Georgia is a home rule state, any building department can chose to pass an ordinance requiring that either the building department conduct the testing or an independent third party conduct the testing required in the code. It is important to note that Appendix C of the 2011 Georgia Supplements and Amendments titled “Third Party Verification” is an optional amendment for local jurisdictions to allow third-party verification of the insulation, air-sealing and other mandatory requirements of the energy code. This appendix is not intended to be used to require independent third-party DET Verifiers.

Best Practices: Verifying Compliance with Testing Requirements

If the building department is not doing the testing, then it must ensure the testing is done and that the building meets the test requirements. Because the test results are required to be written on the compliance certificate per the energy code, the majority of building departments use the compliance certificate to let contractors know that the testing requirements will be checked. Savannah, like many building departments, simply checks the numbers on the certificate, which is required to be posted at the home. Chatham, like a large number of building departments, requires that the compliance certificate be submitted to the department prior to issuance of the Certificate of Occupancy (CO). The following discussion lists this and other innovative ideas by several building departments across the state for enforcing this requirement and ensuring that all parties involved are honest in their transactions. Their ideas and their benefits are discussed below:

Provide Certificate to Builders: The City of Augusta provides a compliance certificate sticker to every builder when they apply for a permit. Although this sticker cost the city time to develop (Augusta shrank the size of the certificate to 60 percent of its original size so that it will fit better on an electrical panel) and print (at $1.40 per sticker), this cost is recouped by raising permit fees two dollars. [16] By providing the sticker at the permit process, Augusta educates the builder on the importance of filling out the certificate to receive their CO and helps builders meet this new requirement in the energy code.

[16] Masters, Marshall. "Energy Code Enforcement in Augusta." Telephone interview. 9 Jan. 2012.

Submittal Requirement of Compliance Certificate Prior to CO: The cities of Athens[17], Augusta, Columbus[18], Gainesville[19], Marietta[20],and Valdosta[21] and Cobb County[22] all require that builders submit a copy (usually via fax) of the completed compliance certificate prior to issuing the certificate of occupancy for the building. This not only ensures that the requirement of a compliance certificate is met, but it creates a written, public record of the testing results, load calculations and insulation values in every new home. By creating a public record of this requirement, homeowners can find out the qualities of their new home. It also encourages builders/verifiers to fill out the certificate correctly thereby improving compliance with the testing requirement.

Submittal Requirement of Partially Completed Compliance Certificate With or Soon after Permit Application: Both cities of Columbus[18] and Marietta[20] require that a partially completed compliance certificate be completed with or soon after a permit application is applied for. By requiring that a builder submit a partially complete certificate with submittal or soon thereafter, the builder must familiarize himself with many of the requirements in the energy code, which are acknowledged on the certificate. In addition, it allows the building department to catch any issues with noncompliance as it relates to the insulation and window values to be installed in the home. Finally, it requires the builder to begin thinking about the type and size of the HVAC system in the house as they must fill out the load calculation portion of the certificate. Proper planning for the HVAC system prior to construction is important for quality code compliant installation. Filling out the information about the HVAC system also allows the building department to verify that the equipment installed meets the information on the compliance certificate during the mechanical inspection.

Affidavit Submittal: Some building departments require an affidavit to be submitted to ensure that the DET Verifier requirements are met. In Columbus[18] the builder must complete an affidavit that that the home meets the requirements in the energy code. This affidavit is accompanied by the compliance certificate before issuance of the CO. An affidavit is also submitted with a partially completed compliance certificate to receive the building permit. In Augusta,[16] the DET Verifier completes the affidavit and includes their name, the test results and how they became certified to conduct the testing. In Kennesaw, the DET Verifier test results are submitted to the building department on the DET Verifier's letterhead. This affidavit or submittal of test results reminds the builder or DET Verifier that they are liable for the accuracy of their test results and for meeting the requirements of the energy code. This reminder also reinforces the requirements of the energy code and encourages quality construction and accurate testing to achieve compliance.

Spot Check of Duct and Envelope Test Results: The City of Valdosta's Building Department is considering conducting their own testing to spot check on the duct and envelope test results in their jurisdiction.[21] The City of Albany is spot checking results by watching DET Verifier perform the test on certain homes.[23] Code officials in the cities of Albany and Valdosta believe that the majority of the duct and envelope testing results are accurate. However, many inspectors have reason for concern that some are not. One department reported that a builder failed the DET test with one DET Verifier but passed with a second separate DET Verifier. A DET Verifier reported to Southface staff that one builder confessed to simply writing numbers on the compliance certificate that met the

[17] Hansford, Doug. "Energy Code Enforcement in Athens-Clarke County." Telephone interview. 9 Jan. 2012.
[18] http://www.columbusga.org/inscode/
[19] Davidson, Joe. "Energy Code Enforcement in Gainesville." Telephone interview. 9 Jan. 2012.
[20] Cosper, Hal. "Energy Code Enforcement in Marietta." Telephone interview. 9 Jan. 2012.
[21] Martin, Mike. "Energy Code Enforcement in Valdosta." Telephone interview. 10 Jan. 2012.
[22] http://comdev.cobbcountyga.gov/documents/EnergyCodeinformationletter.pdf
[23] Williams, Jon. "Energy Code Enforcement in Augusta." Telephone interview. 17 Jan. 2012.

requirements instead of paying to have the test conducted. The building department in Acworth reported that a builder in their jurisdiction passes the test when hiring a DET Verifier in a neighboring jurisdiction; however, when the homes are tested in Acworth, they consistently fail. For these reasons, a spot check to verify compliance would help keep the industry testing accurate and honest.

The City of Valdosta expects to begin spot checking results once they can rent equipment through the DCA-funded leasing program. They plan to test all builders in the area once. They also plan to continue to spot check homes afterwards, especially when they are suspicious of the results. The City of Albany does not plan to conduct the test but has witnessed the test many times to ensure accuracy and to learn more about the air-sealing and duct-sealing issues for builders. The City of Atlanta is considering hiring a separate Home Energy Rating Systems rater, an individual with more qualifications than a typical DET Verifier, to spot-check results for them.

In all cases, spot checking results is one of the best methods for improving compliance with the DET Verifier requirements. By spot checking results, both DET Verifiers and builders are more likely to comply with the requirements as the building department could revoke their HVAC or building license if the test is not conducted properly. If city inspectors were to witness or conduct the test themselves, spot checking results would also inform inspectors on the most common air-sealing and duct sealing issues in the homes built in their area.

Although it is the most effective and realistic method for improving compliance with the testing requirement, it could also be the most costly method. Building departments would have to find a way to fund costs such as training and staff time to conduct the test, training and staff time to monitor testing conducted by others, equipment or equipment rental costs, and contractor costs for conducting the test for the department.

Section Nine:

Department Funding and Resources

Every dollar spent on energy code compliance and enforcement yields $6 in energy savings.[24]

Funding the implementation and enforcement of energy codes is a substantial hurdle to creating a meaningful infrastructure for the success of energy codes. But by looking to best practices and learning more about various funding opportunities and their significant impact, building departments can tailor a strategic funding plan to meet their needs and enable their effectiveness. As a result, proper energy code implementation and enforcement represent an opportunity for Georgia building departments to secure substantial benefits for its citizens for generations to come.

In Georgia, there are two main models for funding energy code enforcement. The majority of building departments rely on their jurisdictional budget or general fund for funding their department and thus energy code enforcement. In fact, a 2011 DCA report, "State Energy Code Compliance Evaluation Pilot Study for Commercial New Buildings and Additions" (2011 DCA Compliance Evaluation), found that 79 percent of Georgia building departments surveyed rely on their jurisdictional budget for funding.[25] A smaller number of building departments rely on a pool of money funded only by permitting and inspection revenue, called an enterprise fund, for their revenue. Savannah, like the majority of building departments, relies on their general fund for a source of revenue whereas Chatham County relies on an enterprise fund for revenue. The following discussion provides more detail on how Savannah and Chatham County are funded and the benefits and drawbacks of each model of funding.

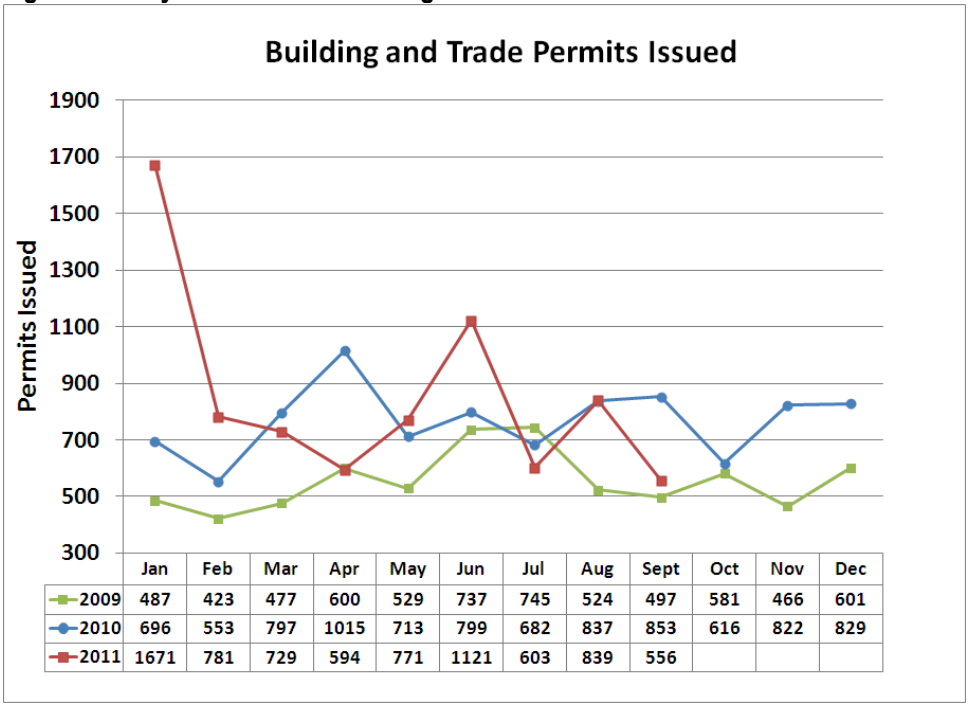
City of Savannah and the General Fund

Savannah's primary source of revenue is their general fund, which is then supplemented by permit fees and fines. In 2010, Savannah's permitting, inspections and zoning work cost approximately $2.6 million in expenses while generating only $1.4 million in revenue. The following figures show the number of building permits issued in Savannah and the valuation of those permits.

[24] $810 Million Funding Needed to Achieve 90 percent Compliance with Building Energy Codes." *Online Code Environment and Advocacy Network*. IMT, 1 Sept. 2010. Web. 02 Feb. 2012. <http://bcap-ocean.org/resource/funding-needed-achieve-90-compliance>.

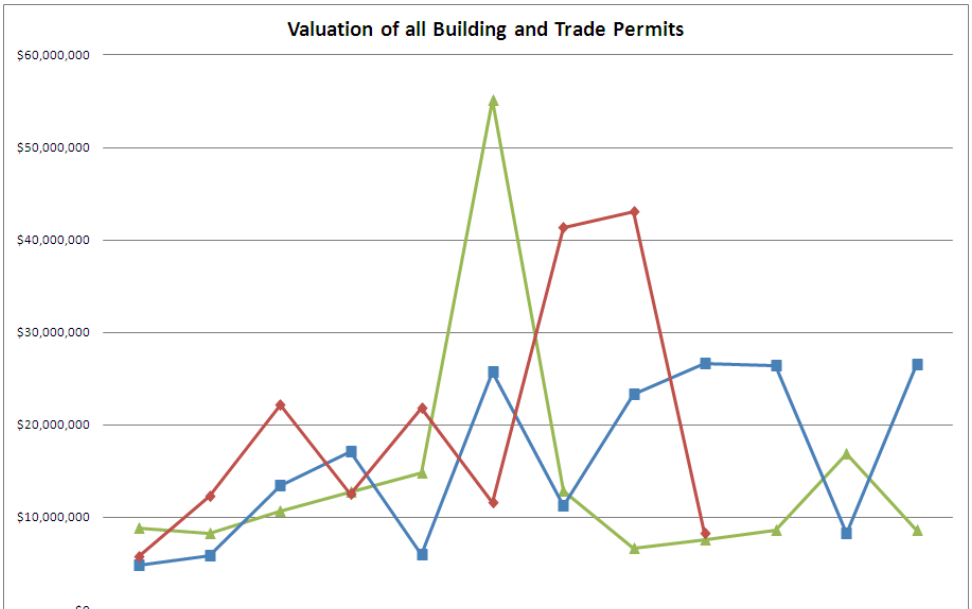
[25] Towson, Bill. "State Energy Code Compliance Evaluation Pilot Study for Commercial New Buildings and Additions." *Www.EnergyCodes.gov*. Georgia Department of Community Affairs, 30 June 2011. Web. <http://www.energycodes.gov/arra/pilot_studies/Georgia_FinalReport.pdf>.

Figure 1.1. City of Savannah: Building and Trade Permits Issued[26]



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2009	487	423	477	600	529	737	745	524	497	581	466	601
2010	696	553	797	1015	713	799	682	837	853	616	822	829
2011	1671	781	729	594	771	1121	603	839	556			

Figure 1.2. City of Savannah: Valuation of All Building and Trade Permits[27]



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
2009	$8,792,512	$8,307,358	$10,665,516	$12,774,062	$14,847,740	$55,087,998	$12,883,406	$6,648,787	$7,565,186	$8,604,875	$16,904,071	$8,592,005
2010	$4,856,644	$5,832,764	$13,377,225	$17,121,083	$5,930,405	$25,670,914	$11,277,895	$23,355,046	$26,647,188	$26,416,758	$8,303,905	$26,561,236
2011	$5,701,592	$12,240,602	$22,197,990	$12,469,172	$21,833,403	$11,541,916	$41,355,583	$43,069,561	$8,250,890			

[26] Development Services Home." *Building and Trade Permits*. City of Savannah Development Services. Web. 02 Feb. 2012. <http://www.ci.savannah.ga.us/spr/SPRGuide.nsf/7A56FA5D4C222AB985256AF70065EBD5/E5AAB32D719C59C385256B240070FB5F?>.

[27] *Ibid.*

Benefits of the General Fund Model

Because Savannah's Building Department does not rely only on permit fees for a source of revenue, they have the ability to use the permit fee to facilitate economic activity in Savannah. For example, in an economic recession, Savannah has the flexibility to reduce permit fees to encourage growth and business development in their city. Savannah's Building Department can also draw on the general fund in times of an economic recession to maintain the staff necessary to conduct code enforcement.

Drawbacks of the General Fund Model

Because many building departments with access to the general fund have a fixed annual budget, they cannot react as quickly to a large increase in construction volume by hiring new staff. Therefore, a sharp increase in economic activity can result in a staffing shortage, while a sharp decrease in economic activity can result in a building department having too much staff. These sharp increases and decreases in permit activity are displayed in Figure 1.1 above.

Large building departments, like Savannah, also have to monitor permit fees when there is a large increase in economic activity. Title 48 in Georgia state law requires that a building department's permit fees and any other related revenue cannot contribute to general jurisdictional budgets; they can only be used to support activities within that department. A few building departments with this model have been sued by local Home Builder's Associations for not complying with this law, i.e., using permit fees to supplement the general fund. For example, the City of Atlanta's building department was sued in 2005 for supplementing other government operations with permitting revenue. The City of Atlanta has recently moved to an enterprise and reserve fund like Chatham County.

Chatham County and the Enterprise Model

Chatham County's primary source of revenue for code enforcement is their enterprise fund, which ranged from approximately $1.2 million to $1.4 million annually over the past 10 years, inclusive of other services such as income from business licenses, animal control, and property maintenance. The following table lists the number of single family permits and total construction value in Chatham County.

Table 1.3. Chatham County Unincorporated Area:
Value of Residential Construction Assessed by Permit Data[28]

Year	Total Construction Value	Number of Single Family Homes	Percent of Residential Construction Value- Single Family
2006	$ 112,933,628.00	787	86.0%
2007	$ 119,410,457.00	624	79.5%
2008	$ 72,395,757.00	420	80.1%
2009	$ 59,269,270.00	330	71.5%
2010	$ 43,909,359.00	241	67.6%

Benefits of the Enterprise Model

As a self-sustaining infrastructure reliant on revenue generation, the enterprise fund model is ideal in areas of increasing economic and building development with highly organized processes. The enterprise fund allows Chatham County to maintain appropriate staff for the construction activity. For example, building departments with an enterprise fund can staff up more quickly when there is an increase in construction. The enterprise fund also guarantees that the building department complies with state law and can help fund additional activities like education that other building departments may not be able to afford.

Drawbacks of Enterprise Model

Some building departments with an enterprise fund may run into funding issues in times of economic recession. If no reserve fund is created, building departments run the risk of having to lay off employees, losing their expertise during economic hardship. Additionally, building departments run the risk of hindering economic activity by having to increase permitting fees during an economic recession to maintain staff. For example, during the economic boom Chatham County operated with enough surplus to both offer rebates to its citizens and lower permit fees. However, during times of economic recession, permit fees have increased and rebates are no longer available. Ideally, one would decrease permit fees and offer rebates during a recession to encourage construction.

State law does allow building departments to contribute a "reasonable" excess in permit fee revenue to a reserve fund. Chatham County, for example, is allowed to keep their reserve fund contribution at 10 percent or less. The department contributed to this reserve fund until the economic downturn and has been able to draw on this reserve fund during the downturn to maintain services in the department. Without this reserve fund, the enterprise fund model may not be viable in many areas of the state.

Plan Review, Permit, and Re-Inspection Fees

The 2011 DCA Compliance Evaluation found that 49 percent of Georgia building departments surveyed rely on permitting revenue for funding.[29] Fees are an immediate source of revenue for Georgia building departments. These

[28] Building Permits Survey." *Censtats Database*. US Census Bureau. Web. 5 Jan. 2012. <http://censtats.census.gov/bldg/bldgprmt.shtml

[29] Towson, Bill. "State Energy Code Compliance Evaluation Pilot Study for Commercial New Buildings and Additions." *Www.EnergyCodes.gov*. Georgia Department of Community Affairs, 30 June 2011. Web. <http://www.energycodes.gov/arra/pilot_studies/Georgia_FinalReport.pdf>.

fees should be paid up front, so building departments do not suffer from projects that are not completed. However, the cost of fees should be monitored overall so they do not serve as a deterrent to development.

Best practices and Georgia law dictate that plan review and permit fees should follow or closely mirror the 2009 *International Building Code* (IBC) rating system, which is based on building valuation data.[30] Specifically, O.C.G.A. § 48-13-9 (e)(5) states, "For construction projects that are classified as new construction, the number of square feet of construction or the number of square feet of construction to be served by the system to be installed, in conjunction with and limited by the building valuation data, as established from time to time by the International Code Council or by similar data, and in conjunction with and limited by the hourly rate . . . ." Building departments are required to use the building valuation data that the ICC updates every six months, with a table that "provides the 'average' construction costs per square foot, which can be used in determining permit fees for a jurisdiction," along with permit fee schedules found in Section 109.2 of the 2009 IBC.[31]

Section 109.3 addresses building permit valuations, and "fees can be established by using the BVD table and a Permit Fee Multiplier, which is based on the total construction value within the jurisdiction for the past year."[32] These fees—which apply to all kinds of construction, including new construction, renovations, and other permitted work in existing buildings—are specifically intended to provide revenue to fund code compliance activities through an estimated but precise system.

Re-inspection fees can also serve as an effective deterrent to noncompliance when the re-inspection fee fully-covers the cost of additional inspections.[33]

The above practices are well ingrained in many building departments, have been accepted as a valuable source of revenue, and are highly recommended for those building departments that do not already follow this structure. Some building departments place a surcharge on permit fees to fully cover their cost. This practice is not encouraged since it serves as a disincentive for building and economic activity. Savannah and Chatham County both follow the aforementioned best practices as discussed below.

Fees in Savannah

Savannah supplements its jurisdictional funding with plan review, permit, and re-inspection fees. Building plan review fees are aligned with the recommended IBC rating system and are assessed according to the cost of construction as follows:

Table 2.1. City of Savannah Building Plan Review Fee[34]

Construction Cost	Plan Review Fee
$ 0 – 6,000	$ 32
$ 6,001 – 25,000	$ 50

[30] Building Valuation Data: August 2011." International Code Council. Web. 15 Jan. 2012. <www.iccsafe.org/cs/Documents/BVD/BVD-0811.pdf>.
[31] *Ibid.*
[32] *Ibid.*
[33] Kentucky Strategic Compliance Plan." BCAP, 30 Nov. 2011. Web. 15 Jan. 212. <http://bcap-ocean.org/sites/default/files/resources/Kentucky%20Strategic%20Compliance%20Plan.pdf>.
[34] Typical City of Savannah Fees Related to a Building Permit." City of Savannah Development Services. Web. 15 Jan. 2012. <Typical City of Savannah Fees Related to a Building Permit>.

$ 25,001 – 50,000	$ 100
$ 50,001 – 100,000	$ 150
$ 100,001 – 500,000	$ 200
$ 500,001 – 1,000,000	$ 300
$ 1,000,001 – 5,000,000	$ 500
$ 5,000,001 – 10,000,000	$ 1,000
Over $ 10,000,000	$ 2,000

Savannah also has all-inclusive building permit fees structured as follows: "$8.00 per $1,000 of Cost of Construction up to $5,000,000, plus; $4.00 per $1,000 of Cost of Construction between $5,000,000 and $10,000,000, plus; $2.00 per $1,000 of Cost of Construction in excess of $10,000,000."[35] As stated previously, Savannah's department is supplemented by the general fund; therefore, these fees do not cover the costs of plan review and inspection. Finally, Savannah also has re-inspection fees of $30 for the first re-inspection and $50 for the second re-inspection. Savannah has recently implemented a $500 fee for working without a permit to discourage unregulated building projects.

Fees in Chatham County

As stated above, Chatham County creates their enterprise and reserve funds through the income they receive from plan review, permit (also based on the ICC rating system), and re-inspection fees. Plan review fees for both residential and commercial permits are a non-refundable "fee of $2.00 per thousand dollars of the construction value."[36] "Residential permit fees are assessed at $6.00 per thousand dollars of construction value based on the greater of $80/sq. ft., and the submitted value," while "[c]ommercial permits fees are assessed at $7.00 per thousand dollars of construction value based on the greater of $100/sq. ft, and the submitted value."[37] Examples of these fee assessments are outlined in the following table:

Table 2.2. Chatham County Fee Examples[38]

Construction Cost	Plan Review Fee
$ 5,000	$ 10
$ 25,000	$ 50
$ 50,000	$ 100

If the Chatham's Building Department must re-inspect a home for a third time, then they charge a $30 re-inspection fee. These fees are used primarily to train building code inspectors. From 2008-2010, these permit and re-inspection fees were assessed as follows:

[35] *Ibid.* Additionally, "[f]or buildings constructed by eleemosynary institutions values in excess of $15,000,000, the total fee shall be based on $2.00 per $1,000 of building value."

[36] Chatham County Building Safety & Regulatory Services: Building Permit Applications." *Applications for Download*. Chatham County Building Safety & Regulatory Services: Home. Web. 12 Jan. 2012. <http://buildingsafety.chathamcounty.org/PermitsInspections.aspx>.

[37] *Ibid.*

[38] CHATHAM COUNTY BUILDING SAFETY RECORDS (2008−2011). On file with author.

Table 2.3. 2008−2010 Chatham County Permits, Re-Inspections, and Fees[39]

Year	Permits	Re-Inspections	Permit Fees Collected
2008	4937	*1,485	$ 110,070
2009	7131	1,227	$ 93,445
2010	6137	1,303	$ 98,088

*Excluding January through April, 2008.

Additional Funding Opportunities and Resources

Utility Resources: There are numerous ways that utilities can voluntarily support building departments. They can provide financial and in-kind resources to support training and certification for code-related programs, assist building departments with code implementation, provide diagnostic tools, software, or code books and assist with compliance evaluations studies.[2] Additionally, utilities can support codes through financial incentives and consumer education.[3]

For example, in 2011, Georgia Power provided assistance on energy code compliance activities by funding and training nearly 200 DET Verifiers, printing materials for energy code trainings conducted throughout the Southeast and providing venue space for building department meetings. Atlanta Gas Light Company has also conducted numerous trainings.

Throughout the Southeast and the nation, utility companies are expressing an interest and willingness to invest in energy efficiency at the system level. Examples include Southern Company's recent and significant expansion of programs in Georgia and Florida, Entergy's increasing energy efficiency investments in Arkansas and New Orleans, and the Tennessee Valley Authority's (TVA) aggressive ramp up of its programs in Tennessee, Alabama, Mississippi and parts of Georgia, North Carolina and Virginia. Georgia Power's current demand side management programs focus on incentivizing energy efficiency retrofits and new energy efficient construction.

State and Federal Opportunities: The 2011 DCA Compliance Study found that none of the Georgia building departments surveyed rely on the state for funding.[40] State and federal grant money and other opportunities can fund code implementation and enforcement programs within building departments when there are proper resources available to secure these funds.[41] Most often, other organizations will acquire state or federal funding or resources that can then be made available to building departments. For example, GEFA has funded education, training, and resources in the past for building departments. Through American Recovery and Reinvestment Act (ARRA) of 2009 funding through GEFA, DCA has also been able to provide about 30 blower door and duct blaster kits through a loan program administered by the Home Builders Association of Georgia.

Streamlining Compliance Processes: "Streamlining is the practice of improving building regulatory processes to remove overlap and duplication and create more efficient administrative procedures."[42] As one would expect, creating

[39] Chatham County Building Safety & Regulatory Services: Building Permit Applications." *Applications for Download*. Chatham County Building Safety & Regulatory Services: Home. Web. 12 Jan. 2012. <http://buildingsafety.chathamcounty.org/PermitsInspections.aspx>.

[1] *Ibid.*

[40] Towson, Bill. "State Energy Code Compliance Evaluation Pilot Study for Commercial New Buildings and Additions." *Www.EnergyCodes.gov*. Georgia Department of Community Affairs, 30 June 2011. Web. <http://www.energycodes.gov/arra/pilot_studies/Georgia_FinalReport.pdf>.

[41] Kentucky Strategic Compliance Plan." BCAP, 30 Nov. 2011. Web. 15 Jan. <http://bcap-ocean.org/sites/default/files/resources/Kentucky%20Strategic%20Compliance%20Plan.pdf>.

[42] For more information on streamlining, including the regulatory review process, identifying areas to streamline, and strategies for streamlining, Ryan Myers, Streamlining Code Compliance Processes 2 (2011). On file with author.

a more streamlined, efficient process saves time, money, and resources that can be re-designated for other uses, such as energy code implementation and enforcement. The Alliance for Building Regulatory Reform in the Digital Age emphasizes that streamlining is about "reducing the amount of time it takes to move a new building or building renovation through the regulatory process by as much as 80 percent annually saving both the private and public sectors tens of billions of dollars [in the long term]."[43] Although Georgia building departments are likely to capture more modest reductions and savings figures, the opportunity for savings—even when lessened—is still significant.[44]

Opportunities for streamlining exist in the areas of communication, permit application processing, plan submission review; and scheduling, training, and education.[45] An accessible webpage that clearly articulates the phases and needs of each stage of the building review process helps answer common questions or mistakes and streamline communication with citizens, builders, and developers.[46] Supplementing the permit application with a checklist facilitates more complete applications.[47] Checklists are also recommended for the plan review process to help to clearly communicate the code and specific local requirements.[48] Streamlining inspection scheduling on a central system that is based on proximity and also employing multi-discipline inspectors can reduce travel and administrative burdens.[49] Adequate inspector training also ensures more efficient work.[50] For this reason, Savannah's Building Department expects to spend more than 40 percent of their budget (excluding personnel costs) on training, education and books.[51] Finally, educating local builders, tradesmen and design processionals on common violations through printed brochures, online courses, classroom training, in-field training and publications recognizes the role of building departments as public educators, while also saving time and reducing violations in the long term.

Other Resources: Building departments should look for available resources and training through organizations like the BOAG and Southface. When needed, technical assistance and other resources can be explored through organizations such as the Regulatory Assistance Project (RAP) (http://www.raponline.org) and initiatives such as the National Action Plan for Energy Efficiency,[52] and the State and Local Energy Efficiency Action (SEE Action) Network (http://www1.eere.energy.gov/seeaction/index.html). [53] Building departments can access information regarding

[43] *National Partnership to Streamline Government*. Alliance for Building Regulatory Reform in the Digital Age. Web. 12 Jan. 2012. <http://www.natlpartnerstreamline.org/index.php>.

[44] For example, "Ventura County, CA, noted that for their investment of $160,000 for a permits and inspections software package, the County had saved over $1,000,000 in costs and reduced staff by 3 people while their workload increased by 80% over a 6-year period." NCSBCS/Alliance Survey on Savings from the Application of Information Technology to Building Codes Administration and Enforcement Processes." National Conference of States on Building Codes and Standards, Inc., 24 May 2005. Web. 12 Jan. 2012. <http://www.natlpartnerstreamline.org/2006CD/content/pdf/ROI_Report_May05.pdf>.

[45] For more information on streamlining, including the regulatory review process, identifying areas to streamline, and strategies for streamlining, Ryan Myers, Streamlining Code Compliance Processes 2 (2011). On file with author.

[46] *Ibid.*

[47] *Ibid.*

[48] *Ibid.*

[49] *Ibid.*

[50] *Ibid.*

[51] City of Savannah Building Department, 2012 Budget Request – Building Inspectors/Plan Review (2012). On file with author.

[52] *National Action Plan for Energy Efficiency | Clean Energy | US EPA*. US Environmental Protection Agency. Web. 12 Jan. 2012. <http://www.epa.gov/cleanenergy/energy-programs/suca/resources.html>.

[53] The state and Local Energy Efficiency Action Network is a state and local effort facilitated by the federal government that helps states, utilities, and other local stakeholders take energy efficiency to scale and achieve all cost-effective energy efficiency by 2020. This initiative has engaged diverse stakeholders in the development and implementation of eight energy efficiency roadmaps across the residential, commercial, and industrial sectors, as well as key crosscutting topics, including evaluation, measurement and verification; financing; building codes; consumer information and behavior; and utility motivation and energy efficiency.

efficiency policies and available incentives through the Database of State Incentives for Renewables & Efficiency (DSIRE) (www.dsireusa.org), including available tax credits, rebates, grants, loan, and financing programs.[54]

Best Practices

General Fund Model: The General Fund model is ideal for building departments with a steady workload. By relying on the general fund, building departments like Savannah have greater flexibility to reduce permit fees in times of economic recession to encourage building activity and economic growth.

Enterprise Model: When coupled with a reserve fund, the enterprise model like Chatham County is a self-sustaining model that is ideal for building departments with enough building activity to be self-supporting. The reserve fund is essential to help insulate building departments in times of economic hardship.

Plan Review Fees: Plan review fees should closely follow the International Building Code recommendations that are based on building valuation data that is updated every six months. These fees should be paid up front, so building departments do not suffer from projects that are not completed. Charging more than these guidelines discourages building activity.

Re-Inspection Fees: Re-inspection fees provide a monetary incentive to encourage code compliance and typically run from $30 to $50.

Surcharges: Surcharges are not encouraged since they serve as a disincentive to building and economic activity.

Utility Resources: Building departments are encouraged to work with utilities like Georgia Power to take advantage of their available resources, such as free training, printing and venues for meetings. Additionally, building departments can coordinate energy efficiency programs with non-regulated utilities.

State and Federal Opportunities: Building departments should take advantage of resources made available through state and federal funding, as available.

Streamlining Compliance Processes: Building departments can streamline processes through best practices that include an accessible and clearly articulated website; checklists for the permit applications and plan reviews; a central inspection scheduling system based on proximity; multi-discipline inspectors; inspector training; and education for builders, tradesmen, and design professionals on common code violations.

Partnerships: Building departments can partner with other building departments on joint training and compliance activities or to establish an Energy Code Ambassador Program within a region.

Other Resources: Building departments should also utilize other opportunities, including training, education, and technical assistance provided by organizations like BOAG and Southface, and national resources like RAP and SEE Action. They can also increase the awareness of available tax credits, rebates, grants, loan, and financing programs

[54] Georgia: Incentives/Policies for Renewables & Efficiency." *DSIRE: Incentives/Policies for Renewables & Efficiency*. DSIRE. Web. 12 Jan. 2012. <http://www.dsireusa.org/solar/incentives/index.cfm?re=1>.

for their customers through clearinghouses like Database for State Incentives for Renewables and Efficiency (DSIRE) at www.dsireusa.org.

Section Ten:
Conclusion

Assuring compliance with Georgia's new energy code statewide requires a strong commitment to understanding code enforcement infrastructure across the state and sharing of procedures and best practices among local governments. This challenge is compounded by the state's multitude of cities and jurisdictions, whose building departments must independently work through the challenges of enforcing the new code. Fortunately, moving the state toward 90 percent compliance with the latest energy code by 2017 requires the adoption of straightforward practices that are easily replicated, usually with additions to existing code efforts currently underway.

The two Georgia jurisdictions selected for this report, City of Savannah and Chatham County, provide good examples for plan review and code inspection processes that can be easily replicated across the state. Among other best practices, these jurisdictions are flexible and business-friendly, maintain a commitment to educate private-sector building professionals, and utilize free software and other resources such as REScheck and COMcheck. Both departments have also developed protocols for reviewing contractor documentation of new testing requirements, although these efforts could be expanded as more pipeline construction projects fall under Georgia's updated energy code.

Savannah and Chatham County will also inspect the state-issued Georgia Residential Energy Code Compliance Certificate to ensure that it is completed correctly and located on the electrical panel box or air handler. This form requires contractors to self-certify as meeting the energy code. Additionally, both departments take training and certification of plan reviewers and inspectors seriously, although like many jurisdictions statewide they are interested in additional training on the energy code. The two departments manage the finances of their code enforcement infrastructures differently, with Savannah's department funded through the city's general fund while Chatham's is structured as an enterprise fund. Although there are positives and negatives associated with each funding mechanism, both departments are able to enforce the energy code effectively given their respective inspection responsibilities.

Like other jurisdictions across the state, Savannah and Chatham County could further enhance their plan review and inspection efforts. Among other changes, this report proposes that the departments continue to invest in additional energy code training and to augment training efforts, which currently coincide with the adoption of a new code. Training between code adoption cycles is crucial, as it helps inspectors stay up-to-date on energy code provisions. Also, while the departments have taken steps to ensure builders are aware of testing requirements mandated by the new code, additional measures could ensure compliance with these changes. Among other innovations currently being considered elsewhere in Georgia, Savannah and Chatham County could take a number of actions, such as providing an overview of how they intend to enforce testing requirements, issuing compliance stickers to builders, requiring submittal of the energy code compliance certificate prior to issue of certificate of occupancy, and spot-checking the results.

Additionally, the report suggests that the department could provide additional guidance to designers using REScheck and COMcheck to ensure that they demonstrate compliance with the latest version of the energy code with Georgia-specific amendments. Additional scrutiny to review of HVAC loading calculations is also recommended. Finally, the report suggests that both departments could improve code compliance for commercial buildings by adding additional

outreach and inspection efforts to ensure commercial roof insulation is upgraded during replacement—which is most cost-effective time to do so.

It is the hope of this report that case studies of the ongoing energy code enforcement efforts will benefit code inspection departments statewide. This report has highlighted successful, easy-to-replicate energy code compliance protocols, tools and practices that could be adopted by other departments. Implemented statewide, these efforts—supplemented by recommendations in this report—would enhance energy code compliance and help save energy and money for Georgia residents and businesses.

Best Practice Matrix

The following table outlines current best practice efforts at the state and local levels identified throughout this report.

	Georgia	City of Savannah	Chatham County
Adoption Page s 2-6	DCA Adopted the 2009 IECC as a minimum code and the 2008 NGBS as a permissive code. DCA adopted mandatory enhancements to the 2009 IECC.	Jurisdiction has adopted the 2009 IECC as mandatory.	Jurisdiction has adopted the 2009 IECC as mandatory.
Training Page 15	GEFA provided funding to support training on the energy code and DET Verification course statewide. 50 technical college instructors are qualified to teach the energy code and provide DET Verification training.	Code officials are required to receive 18 CEUs each year. Training is supported and funded by the city.	Code officials are cross-certified. Code officials present summaries and lessons learned from training events to peers.
Outreach Page 15		Building department holds annual classes for builders and homeowners which provide code education. Flyers are provided to building suppliers in advance of code changes. City offers a website for permit applications.	Building department invites construction professionals to the department to review the code in person. County books a booth and distributes materials at local HBA conferences. County offers a website for permit applications.

	Georgia	City of Savannah	Chatham County
Compliance & Enforcement Strategies Page 15-16	DCA has adopted a Residential compliance certificate. GEFA also provided funding to DCA and HBAG to implement a statewide equipment rental program for duct blasters and blower doors.	Optional use of RES*check* or COM*check* and ACCA Manual J. All approval processes are housed under one roof. Non-compliance during both plan review and inspection is treated as educational opportunity, not a lecture. All provisions of energy code are checked for compliance individually. Department conducts stand-alone insulation inspection. Department plans to examine and spot-check Blower Door Tests for correctness.	Required use of RES*check* or COM*check* and ACCA Manual J. All approval processes are housed under one roof. Non-compliance during both plan review and inspection is treated as educational opportunity, not a lecture. Contractors may use website to check permit approval status. All provisions of energy code are checked for compliance individually. Department conducts stand-alone insulation inspection. Department "loans" code officials to smaller jurisdictions. Department requires compliance certificate to be submitted prior to issuance of certificate of occupancy. Flexible staff responsibilities allow for resources to go where they are needed most.
Funding Pages 42-43		General fund model reduces dependence on permit fees. Building department assesses plan review fees based on ICC model. Re-inspection fees assessed to encourage compliance. Surcharges are not assessed. Building department leverages utility funding, state and federal opportunities, and services offered by outside organizations.	Enterprise model and reverse funding allow building department to be self-sustaining. Building department assesses plan review fees based on ICC model. Re-inspection fees assessed to encourage compliance. Surcharges are not assessed. Building department takes steps to streamline efforts. Building department leverages state and federal opportunities and services offered by outside organizations.

Appendix A:

Sample Georgia REScheck Report

RES*check* Software Version 4.4.2

Compliance Certificate

Project Title: Energy Code Building

Energy Code:	**2011 Georgia State Minimum Standard Energy Code**
Location:	**Savannah, Georgia**
Construction Type:	**Single Family**
Building Orientation:	**Bldg. faces 0 deg. from North**
Glazing Area Percentage:	**16%**
Heating Degree Days:	**1847**
Climate Zone:	**2**

Construction Site: Savannah, GA

Owner/Agent:

Designer/Contractor:

Compliance: **Passes using UA trade-off**

Compliance: **4.0% Better Than Code** Maximum UA: **1827** Your UA: **1754** Maximum SHGC: **0.30** Your SHGC: **0.30**

The % Better or Worse Than Code index reflects how close to compliance the house is based on code trade-off rules.
It DOES NOT provide an estimate of energy use or cost relative to a minimum-code home.

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Glazing or Door U-Factor	UA
Floor 1: Slab-On-Grade:Unheated Insulation depth: 0.0'	1335		0.0		1391
Wall 1: Wood Frame, 16" o.c. Orientation: Unspecified	2485	13.0	0.0		167
Window 1: Wood Frame:Double Pane with Low-E SHGC: 0.30 Orientation: Unspecified	400			0.350	140
Door 1: Solid Orientation: Unspecified	44			0.200	9
Ceiling 1: Flat Ceiling or Scissor Truss	1335	30.0	0.0		47

Compliance Statement: The proposed building design described here is consistent with the building plans, specifications, and other calculations submitted with the permit application. The proposed building has been designed to meet the 2011 Georgia State Minimum Standard Energy Code requirements in RES*check* Version 4.4.2 and to comply with the mandatory requirements listed in the RES*check* Inspection Checklist.

Name - Title

Signature

Date

Inspection Checklist

Ceilings:

❑ Ceiling 1: Flat Ceiling or Scissor Truss, R-30.0 cavity insulation

Comments: _____

Above-Grade Walls:

❑ Wall 1: Wood Frame, 16" o.c., R-13.0 cavity insulation

Comments: _____

Windows:

❑ Window 1: Wood Frame:Double Pane with Low-E, U-factor: 0.350, SHGC: 0.30,

For windows without labeled U-factors, describe features:

#Panes _____ Frame Type _____ Thermal Break? _____ Yes _____ No

Comments: _____

Doors:

❑ Door 1: Solid, U-factor: 0.200

Comments: _____

Floors:

❑ Floor 1: Slab-On-Grade:Unheated, R-0 (uninsulated)

Comments: _____

Solar Heat Gain Coefficient:

❑ Solar Heat Gain Coefficient (SHGC) values are determined in accordance with the NFRC test procedure or taken from the default table.

Air Leakage:

❑ Joints (including rim joist junctions), attic access openings, penetrations, and all other such openings in the building envelope that are sources of air leakage are sealed with caulk, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material.

❑ Air barrier and sealing exists on common walls between dwelling units, on exterior walls behind tubs/showers, and in openings between window/door jambs and framing.

❑ Recessed lights in the building thermal envelope are 1) type IC rated and ASTM E283 labeled and 2) sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

❑ Access doors separating conditioned from unconditioned space (e.g., attic, unconditioned basements and crawlspaces) are weather-stripped and insulated (without insulation compression or damage). Where loose fill insulation exists, a wood framed or equivalent baffle is installed to maintain insulation application. Required insulation values are as follows:

(1) Hinged vertical doors have a maximum U-Factor of U-0.2 (R-5 minimum)

(2) Hatches/scuttle hole covers have a maximum U-Factor U-0.05 (R-19 minimum)

(3) Pull down stairs have a maximum U-Factor of U-0.20 with a minimum of 75 percent of the panel area having R-5 minimum insulation

❑ Where air permeable insulation exists in vented attics, baffles are installed adjacent to soffit and eave vents. A minimum of a 1-inch of space is provided between the insulation and the roof sheathing and at the location of the vent. The baffle extends over the top of the insulation inward until it is at least 4 inches vertically above the top of the insulation.

❑ Wood-burning fireplaces have gasketed doors and outdoor combustion air.

❑ Automatic or gravity dampers are installed on all outdoor air intakes and exhausts.

Air Sealing and Insulation:

❑ Building envelope air tightness complies with a post construction blower door test result of less than 7 ACH at 50 Pascals. Test conducted by a certified Duct and Envelope Tightness (DET) verifier.

Materials Identification and Installation:

- ❑ Materials and equipment are installed in accordance with the manufacturer's installation instructions.
- ❑ Insulation is installed in substantial contact with the surface being insulated and in a manner that achieves the rated R-value.
- ❑ Materials and equipment are identified so that compliance can be determined.
- ❑ Manufacturer manuals for all installed heating and cooling equipment and service water heating equipment have been provided.
- ❑ Insulation R-values and glazing U-factors are clearly marked on the building plans or specifications.

Duct Insulation:

- ❑ Supply ducts in attics are insulated to a minimum of R-8. All other ducts in unconditioned spaces or outside the building envelope are insulated to at least R-6.

Duct Construction and Testing:

- ❑ Building framing cavities are not used as supply or return ducts. All supply and return ducts are lined with metal, flex duct, ductboard or other material approved in section M1601 of the IRC.
- ❑ All joints and seams of air ducts, air handlers, filter boxes are substantially airtight by means of tapes, mastics, liquid sealants, gasketing or other approved closure systems. Tapes, mastics, and fasteners are rated UL 181A or UL 181B and are labeled according to the duct construction. Without exception all closure systems have mastic applied that is at least 2 mm (0.08 inches) thick. Metal duct connections with equipment and/or fittings are mechanically fastened. Crimp joints for round metal ducts have a contact lap of at least 1 1/2 inches and are fastened with a minimum of three equally spaced sheet-metal screws.
  Exceptions:

  Joint and seams covered with spray polyurethane foam and mastic.

  Where a partially inaccessible duct connection exists, mechanical fasteners can be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.

  Continuously welded and locking-type longitudinal joints and seams on ducts operating at less than 2 in. w.g. (500 Pa).
- ❑ Duct tightness test has been performed by a certified DET verifier and meets one of the following test criteria when tested at 0.1 inches w.g. (25 Pascals):

  (1) Postconstruction leakage to outdoors test (PCO): Less than or equal to 213.6 cfm (8 cfm per 100 ft2 of conditioned floor area).

  (2) Postconstruction total leakage test (PCT; including air handler enclosure): Less than or equal to 320.4 cfm (12 cfm per 100 ft2 of conditioned floor area).

  (3) Rough-in total leakage test (RIT) with air handler installed: Less than or equal to 160.2 cfm (6 cfm per 100 ft2 of conditioned floor area).

Temperature Controls:

- ❑ Where the primary heating system is a forced air-furnace, at least one programmable thermostat is installed to control the primary heating system and has set-points initialized at 70 degree F for the heating cycle and 78 degree F for the cooling cycle.
- ❑ Heat pumps having supplementary electric-resistance heat have controls that prevent supplemental heat operation when the compressor can meet the heating load.

Heating and Cooling Equipment Sizing:

- ❑ Additional requirements for equipment sizing are included by an inspection for compliance with the International Residential Code.
- ❑ For systems serving multiple dwelling units documentation has been submitted demonstrating compliance with 2009 IECC Commercial Building Mechanical and/or Service Water Heating (Sections 503 and 504).

Circulating Service Hot Water Systems:

- ❑ Circulating service hot water pipes are insulated to R-2.
- ❑ Circulating service hot water systems include an automatic or accessible manual switch to turn off the circulating pump when the system is not in use.

Heating and Cooling Piping Insulation:

- ❑ HVAC piping conveying fluids above 105 degrees F or chilled fluids below 55 degrees F are insulated to R-3.

Swimming Pools:

- ❑ Heated swimming pools have an on/off heater switch.
- ❑ Pool heaters operating on natural gas or LPG have an electronic pilot light.
- ❑ Timer switches on pool heaters and pumps are present.
  Exceptions:

  Where public health standards require continuous pump operation.

  Where pumps operate within solar- and/or waste-heat-recovery systems.
- ❑ Heated swimming pools have a cover on or at the water surface. For pools heated over 90 degrees F (32 degrees C) the cover has a minimum insulation value of R-12.
  Exceptions:

Covers are not required when 60% of the heating energy is from site-recovered energy or solar energy source.

Lighting, Power, Mechanical Requirements:

❑ A minimum of 50 percent of the lamps in permanently installed lighting fixtures are controlled with an occupancy/vacancy sensor or automated lighting control system, or can be categorized as one of the following:

(a) Compact fluorescent

(b) T-8 or smaller diameter linear fluorescent

(c) 40 lumens per watt for lamp wattage <= 15

(d) 50 lumens per watt for lamp wattage > 15 and <= 40

(e) 60 lumens per watt for lamp wattage > 40

❑ Power attic ventilators are not permitted to be connected to the electric grid. Solar-powered attic ventilators are allowed.

❑ Central HVAC system does not use electric resistance as the primary heat source.
Exceptions:

Alterations of 50% or less of the original conditioned floor area in dwellings originally permitted after January 1, 1996.

Alterations to dwellings originally permitted before January 1, 1996.

Other Requirements:

❑ Snow- and ice-melting systems with energy supplied from the service to a building shall include automatic controls capable of shutting off the system when a) the pavement temperature is above 50 degrees F, b) no precipitation is falling, and c) the outdoor temperature is above 40 degrees F (a manual shutoff control is also permitted to satisfy requirement 'c').

Certificate:

❑ A permanent certificate is provided on or in the electrical distribution panel listing the predominant insulation R-values; window U-factors; type and efficiency of space-conditioning and water heating equipment. The certificate does not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels.

NOTES TO FIELD: (Building Department Use Only)

2011 Georgia State Minimum Energy Code

Insulation Rating	R-Value
Ceiling / Roof	30.00
Wall	13.00
Floor / Foundation	0.00
Ductwork (unconditioned spaces):	_____

Glass & Door Rating	U-Factor	SHGC
Window	0.35	0.30
Door	0.20	NA

Envelope Tightness Test Results	
CFM_{50}	_____
Total Conditioned Volume	_____
ACH_{50}	_____
DET Verifer (Name/Phone)	_____

Heating & Cooling Equipment	Efficiency
Heating System:_____	_____
Cooling System:_____	_____
Water Heater:_____	_____

HVAC Loads	
Heating Load	_____
Sensible Cooling Load	_____
Latent Cooling Load	_____
Total Air Handler CFM	_____
Load Calcs by (Name/Phone)	_____

Duct Tightness Test Results	
Test Type (PCO, PCT, RIT)	_____
CFM_{25}	_____
Floor Area Served (s.f.)	_____
Test Result(%)	_____
DET Verifer (Name/Phone)	_____

Builder/Design Professional: _____ **Date:** _____

Comments:

Appendix B:

Sample Energy Code Inspection Checklist

Georgia Residential Energy Code Checklist

2009 International Energy Conservation Code with 2011 Georgia Amendments

Permit Number:_____Date:_____

Building Contact: Name:_____ Phone:_____ Email:_____

Building Name & Address:_____

Conditioned Floor Area:_____ ft^2

Compliance Approach (check all that apply): ☐ Prescriptive ☐ Trade-Off (REScheck) ☐ Energy Model

Green Building/Above-Code Program (if applicable):_____

Mandatory requirement sections are noted with blue text or blue section number highlighted blue. Insulation and window requirements (in black), can be lower than code value if REScheck or energy model is submitted. For more details, including graphics, photos and detailed description of energy code requirements, see the residential field guide and video at www.southface.org/ga-energy-code

IECC Section #	Foundation Inspection	Code Value	Meets Code			Comments/Assumptions
			Y	N	N/A	
402.1.1 303.2, 402.2.8 402.1.1	Slab edge insulation R-value. **Slab edge insulation installed per manufacturer's instructions** **Slab edge insulation depth/length.**	Unheated: R-0 Heated: R-5 Heated: 2 ft	☐	☐	☐	
402.1.1 402.2.7 303.2	Basement wall exterior insulation R-value (if applicable).[1] **Basement wall exterior insulation depth.** **Basement wall exterior insulation installed per manufacturer's instructions**	Continuous: R-5 10 ft. or to basement floor	☐	☐	☐	
402.2.9 303.2	Crawl space wall insulation R-value.[2] **Crawl space wall insulation installed per manufacturer's instructions.**	Continuous: R-5 Cavity: R-13	☐	☐	☐	
402.2.9	Crawl space continuous vapor retarder installed with joints overlapped by 6" and sealed, and extending at least 6" and sealed up the stem wall.[3]		☐	☐	☐	
303.2.1	Exposed foundation insulation protection (if applicable).		☐	☐	☐	
403.8	Snow melt controls.[4]		☐	☐	☐	

Additional Comments/Assumptions: _____

[1] Basement wall exterior insulation is not required if interior insulation is applied or floor above basement wall is insulated.

[2] Crawlspace walls are not required to be insulated if floor above crawlspace is insulated.

[3] This requirement may not be able to be confirmed until the final inspection.

[4] This requirement is not applicable if no snow or ice-melting systems exist (uncommon in Georgia).

IECC Section #	Framing / Rough-In Inspection	Code Value	Meets Code			Comments/Assumptions
			Y	N	N/A	
402.1.1, 402.3.4 402.1.1, 402.3.1, 402.3.3,	Door U-factor. [5] Glazing (window) U-factor (area-weighted average). [6]	U-0.50 Impact Rated: U-0.65	☐	☐	☐	
402.5 303.1.3	**Glazing labeled for U-factor (or default values used).**		☐	☐	☐	
402.1.1,402.3.2, 402.3.3	Glazing SHGC value, including sunrooms and skylights (area-weighted average). [4]	SHGC: 0.30 (0.50 max)[7]	☐	☐	☐	
402.1.1, 402.3.3, 402.5 303.1.3	Skylight U-factor. [4] **Skylights labeled for U-factor (or default values used).**	U-0.65	☐	☐	☐	
402.1.1 303.2	Mass wall exterior insulation R-value. **Mass wall exterior insulation installed per manufacturer's instructions.**	R-5[8]	☐	☐	☐	
403.2.1	Ducts outside of building thermal envelope insulated	Attic Supply: R-8 Other: R-6	☐	☐	☐	
403.2.4	Ducts and AHU sealed with mastic.[15]		☐	☐	☐	
403.2.3	Building cavities NOT used for supply or return ducts.		☐	☐	☐	
402.4.5	Air-tight IC-rated recessed lighting fixtures meet infiltration criteria.		☐	☐	☐	
403.3	HVAC piping insulation.	R-3	☐	☐	☐	
403.4	Circulating hot-water piping insulation.	R-2	☐	☐	☐	
403.5	Dampers installed on all outdoor intake and exhaust openings.		☐	☐	☐	
402.4.4	Glazed fenestration air leakage.	0.3 cfm/ft^2	☐	☐	☐	
402.4.4	Swinging door air leakage.	0.5 cfm/ft^2	☐	☐	☐	
402.4.4	Fenestration and doors labeled for air leakage.		☐	☐	☐	

Additional Comments/Assumptions: _____

[5] One side-hinged door up to 24 ft^2 can be exempted from the prescriptive door U-factor requirements. Exemption cannot be applied to attic access.
[6] Up to 15 ft^2 of glazed fenestration, including skylights, may be exempted from U-factor and SHGC requirements under the prescriptive approach.
[7] SHGC mandatory maximum using trade-offs.
[8] If more than ½ the insulation is on the interior, mass wall interior insulation requirement applies (R-8).

IECC Section #	Insulation Inspection	Code Value	Meets Code Y	Meets Code N	Meets Code N/A	Comments/Assumptions
402.1.1, 402.2.5, 402.2.6 303.2, 402.2.6	Floor insulation R-value. **Floor insulation installed per manufacturer's instructions, and in permanent continuous contact with the underside of the subfloor decking.**	Wood: R-19 Steel:[9] See footnote	☐	☐	☐	☐ Cellulose ☐ Fiberglass Batt ☐ Spray Foam ☐ Other
402.1.1 402.2.5 402.2.4 303.2	Wall insulation (including walls between sunrooms) R-value. **Wall insulation installed per manufacturer's instructions.**	Wood: R-13 Mass: [10] R-8 Steel:[11] See footnote	☐	☐	☐	☐ Cellulose ☐ Fiberglass Batt ☐ Spray Foam ☐ Other
402.1.1 303.2 402.2.7	Basement wall interior insulation R-value. **Basement wall interior insulation installed per manufacturer's Instructions. Basement wall interior insulation depth.**	Continuous: R-5 Cavity: R-13 10 ft or to basement floor	☐	☐	☐	☐ Cellulose ☐ Fiberglass Batt ☐ Spray Foam ☐ Other
402.2.11 303.2	Sunroom ceiling insulation R-value. **Sunroom ceiling insulation installed per manufacturer's instructions.**	R-19	☐	☐	☐	☐ Cellulose ☐ Fiberglass Batt ☐ Spray Foam ☐ Other
402.4.1,402.4.2	Air-seal tubs and showers[12]		☐	☐	☐	
402.4.1,402.4.2	Air-seal window/door openings[12]		☐	☐	☐	
402.4.1,402.4.2	Air-seal assemblies separating garage[12]		☐	☐	☐	
402.4.1,402.4.2	Air-seal bottom plate and top plate[12]		☐	☐	☐	
402.4.1,402.4.2	Air-seal seams in exterior sheathing[12]		☐	☐	☐	
402.4.1,402.4.2	Air-seal utility penetrations[12]		☐	☐	☐	
402.4.1,402.4.2	Air-seal dropped ceiling and chases[12]		☐	☐	☐	
402.4.1,402.4.2	Air-seal rim joist junction[12]		☐	☐	☐	
402.4.1,402.4.2	Air-seal attic kneewall[12]		☐	☐	☐	
402.4.1,402.4.2	Air-seal stairs to unconditioned basement[12]		☐	☐	☐	

Additional Comments/Assumptions: _____

[9] Floor steel frame equivalent: R-19+R-6 in 2x6 or R-19+R-12 in 2x8 or 2x10
[10] If more than ½ the insulation is on the exterior, mass wall exterior insulation requirement applies (R-5).
[11] Wall steel frame equivalent: R-13+R-5; R-15+R-4; R-21+R-3; R-0+R-10
[12] Illustration of construction details can be found in Appendix A of the 2011 Georgia Supplements and Amendments or the Georgia Residential Field Guide.

IECC Section #	Final Inspection	Code Value	Meets Code			Comments/Assumptions
			Y	N	N/A	
402.1.1, 402.2.1, 402.2.2 303.1.1.1, 303.2	Ceiling insulation R-value. **Ceiling insulation installed per manufacturer's instructions. Blown insulation marked every 300 ft^2.**	Wood: R-30 Steel Truss[13] Steel Joist[14]	☐	☐	☐	☐ Cellulose ☐ Fiberglass Batt ☐ Spray Foam ☐ Other
402.1.1	Attic kneewall insulation R-value with **attic-side air barrier.** [15]	R-18	☐	☐	☐	☐ Cellulose ☐ Fiberglass Batt ☐ Spray Foam ☐ Other
402.2.1.1	Wind wash baffle and dam for air-permeable insulation. [15]		☐	☐	☐	
402.2.3	Access hatch and door insulation and weatherstripping.[15]	Hole cover: R-19 Vertical doors/stairs: R-5	☐	☐	☐	
403.6.1	Electric-resistance heat NOT used as the primary heat source.		☐	☐	☐	
404.1	Lighting - 50% of bulbs in permanent fixtures are high efficacy (CFL, fluorescent, LED) or controlled via an occupancy or vacancy sensor.		☐	☐	☐	# Efficient Bulbs: Total Bulbs: Percent Efficient:
402.4.2, 402.4.2.1	Envelope tightness complies with sealing requirements via blower door test. Results posted on compliance certificate. If multifamily (R-2 occupancy), verification via visual inspection instead of blower door test is allowed.	ACH 50 < 7	☐	☐	☐	
403.2.2	Duct tightness test complies with thresholds. Results posted on compliance certificate. If all ducts and equipment inside envelope, test not required and noted on certificate.	RIT: 6% PCT:12 % PCO: 8 %	☐	☐	☐	
403.6	Compliance certificate posted on electrical panel box or air handler		☐	☐	☐	
403.6	HVAC loads calculations and air handler cfm on compliance certificate.		☐	☐	☐	
402.4.3	Site built masonry wood burning fireplace - gasketed doors and outdoor air for combustion.		☐	☐	☐	
403.1.1	Programmable thermostats installed on forced air furnaces.		☐	☐	☐	
403.1.2	Heat pump thermostat or lockout device installed on heat pumps.		☐	☐	☐	
403.4	Circulating hot water systems have automatic or accessible manual controls.		☐	☐	☐	
403.9	Pool heaters, covers, and automatic or accessible manual controls.		☐	☐	☐	
403.10	Power attic ventilators NOT connected to the electric grid.		☐	☐	☐	

Additional Comments/Assumptions: _____

[13] Steel truss equivalent: R-38; R-30+R-3; R-26+R-5.

[14] Steel joist equivalent: R-38 in 2x4 or 2x6 or 2x8; R-49 in any framing.

[15] Illustration of construction details can be found in Appendix A of the 2011 Georgia Supplements and Amendments or the Georgia Residential Field Guide.

Appendix C:

Georgia Residential Energy Code Compliance Certificate

Georgia Residential Energy Code Compliance Certificate*

Address: _____ Permit #: _____
Builder/Design Prof.: _____ Phone: _____

Envelope Summary:

- List the R-Value for the following components:

Flat ceiling/roof:	_____	Sloped/vault ceiling:	_____
Exterior wall:	_____	Above grade mass wall:	_____
Attic kneewall:	_____	Attic kneewall sheathing:	_____
Basement stud wall:	_____	Basement continuous:	_____
Crawlspace stud wall:	_____	Crawlspace continuous:	_____
Foundation slab:	_____	Floors over unconditioned space:	_____
Cantilevered Floor:	_____	Other insulation:	_____

- Fenestration Components:

Window U-factor:	_____	Window SHGC:	_____
Skylight U-factor:	_____	Skylight SHGC:	_____
Glazed Door U-factor:	_____	Opaque Door U-factor: (<50% glazed)	_____

- Building Envelope Tightness (BET):

BET test conducted by: _____Phone:_____
Fan Flow at 50 Pascals=_____CFM_{50} Total Conditioned Volume =_____ft^3
ACH_{50} = CFM_{50} x 60 / Volume= _____ ACH_{50} (must be less than 7 ACH_{50})
Low Rise Multifamily Visual Inspection Option
(The visual inspection option may be conducted by a third-party instead of the BET test for R-2 buildings only.)
Visual inspection conducted by: _____Phone:_____

Mechanical Summary:

Water Heater Energy Factor:_____Ef Fuel type: ☐ Gas ☐ Electric ☐ Other
Number of Heating and Cooling Systems: _____
Heating System Type:
☐ Gas: _____ AFUE ☐ Air-Source Heat Pump: _____HSPF
☐ Other:_____ Efficiency: _____
Cooling System Type (Standard DX, Heat Pump, Geothermal, etc.):_____
Cooling System Efficiency: _____ ☐ SEER ☐ EER ☐ Other
Heating/Cooling Load Calculations Performed by: _____Phone: _____
Total Heating Load (Based on ACCA Man. J or other approved methodology):_____ Btu/h
Total Cooling Load (Based on ACCA Man. J or other approved methodology):_____ Btu/h
Cooling Sensible Load:_____ Btu/h Cooling Latent Load :_____ Btu/h
Total Air Handler CFM (based on design calculations):_____CFM
Duct Tightness Test Conducted by: _____ Phone:_____
CFM_{25} per 100 ft^2 of conditioned floor area = CFM_{25} x 100 / Conditioned floor area served
If all ducts are not located within conditioned space, builder must verify that either the postconstruction duct leakage to outdoors (**PCO**) is ≤ 8%, the post construction total duct leakage (**PCT**) is ≤ 12%, or the rough-in total duct leakage (**RIT**) with air handler installed is ≤ 6%. State which method was used to conduct the duct tightness test:
duct blower (**DB**), modified blower door subtraction method (**MBDS**), or automated multipoint blower door (**AMBD**).

System	Method (DB, MBDS, AMBD)	Test (PCO, PCT, RIT)	CFM_{25}	Area served (ft^2)	Result (%)
1					
2					
3					

*Note: This permanent certificate shall be posted on or in the electrical distribution panel or air handler. Certificate shall be completed by the builder or registered design professional. Where there is more than one value for each component, certificate shall list the value covering the largest area.

Georgia Residential Energy Code Compliance Certificate*

Address: 123 Code Way, Savannah, GA Permit #: 556-7789

Builder/Design Prof.: EC Builder Phone: 912-123-4567

Envelope Summary:

- List the R-Value for the following components:

Flat ceiling/roof:	R-30	Sloped/vault ceiling:	
Exterior wall:	R-13	Above grade mass wall:	
Attic kneewall:	R-13	Attic kneewall sheathing:	R-5
Basement stud wall:		Basement continuous:	
Crawlspace stud wall:		Crawlspace continuous:	
Foundation slab:		Floors over unconditioned space:	R-16
Cantilevered Floor:		Other insulation:	

- Fenestration Components:

Window U-factor:	0.35	Window SHGC:	0.30
Skylight U-factor:		Skylight SHGC:	
Glazed Door U-factor:		Opaque Door U-factor: (<50% glazed)	

- Building Envelope Tightness (BET):

BET test conducted by: D.E.T. Verifier Phone: 912-546-7892

Fan Flow at 50 Pascals= 2763 CFM_{50} Total Conditioned Volume = 24030 ft^3

ACH_{50} = CFM_{50} x 60 / Volume= 6.90 ACH_{50} (must be less than 7 ACH_{50})

Low Rise Multifamily Visual Inspection Option

(The visual inspection option may be conducted by a third-party instead of the BET test for R-2 buildings only.)

Visual inspection conducted by: _____ Phone: _____

Mechanical Summary:

Water Heater Energy Factor: 0.59 Ef Fuel type: ☑ Gas ☐ Electric ☐ Other

Number of Heating and Cooling Systems: 2

Heating System Type:

☑ Gas: 80% AFUE ☐ Air-Source Heat Pump: _____ HSPF

☐ Other: _____ Efficiency: _____

Cooling System Type (Standard DX, Heat Pump, Geothermal, etc.): Standard DX

Cooling System Efficiency: 13 ☑ SEER ☐ EER ☐ Other

Heating/Cooling Load Calculations Performed by: Manual J. Load Phone: 912-265-4321

Total Heating Load (Based on ACCA Man. J or other approved methodology): 49,200 Btu/h

Total Cooling Load (Based on ACCA Man. J or other approved methodology): 37,400 Btu/h

Cooling Sensible Load: 27,000 Btu/h Cooling Latent Load : 10,400 Btu/h

Total Air Handler CFM (based on design calculations): 20,000 CFM

Duct Tightness Test Conducted by: D.E.T. Verifier Phone: 912-546-7892

CFM_{25} per 100 ft^2 of conditioned floor area = CFM_{25} x 100 / Conditioned floor area served

If all ducts are not located within conditioned space, builder must verify that either the postconstruction duct leakage to outdoors (**PCO**) is ≤ 8%, the post construction total duct leakage (**PCT**) is ≤ 12%, or the rough-in total duct leakage (**RIT**) with air handler installed is ≤ 6%. State which method was used to conduct the duct tightness test: duct blower (**DB**), modified blower door subtraction method (**MBDS**), or automated multipoint blower door (**AMBD**).

System	Method (DB, MBDS, AMBD)	Test (PCO, PCT, RIT)	CFM_{25}	Area served (ft^2)	Result (%)
1 Attic	DB	PCO	106.8	1335	8.0
2 Crawlspace	DB	PCO	102.5	1335	7.7
3					

*Note: This permanent certificate shall be posted on or in the electrical distribution panel or air handler. Certificate shall be completed by the builder or registered design professional. Where there is more than one value for each component, certificate shall list the value covering the largest area.

Appendix D:

Georgia Local Government Code Amendment Sample Ordinance and Form

Revised 11-21-11

SAMPLE

ORDINANCE
REGARDING
GEORGIA STATE MINIMUM STANDARD CODES
FOR CONSTRUCTION

ORDINANCE NO._____

AN ORDINANCE REGARDING ENFORCEMENT OF THE GEORGIA STATE MINIMUM STANDARD CODES FOR CONSTRUCTION; AND FOR OTHER PURPOSES.

WHEREAS, the Georgia State Minimum Standard Codes for Construction promote the life, health, safety and general welfare of all citizens, and;

WHEREAS, said Codes are also designed to protect the property of all citizens, and;

WHEREAS, it is the desire of (Mayor and Council/Board of Commissioners) to enforce and/or adopt and enforce, in all respects, the various Georgia State Minimum Standard Codes for Construction, and;

NOW, THEREFORE, BE IT ORDAINED by (the Mayor and Council/Board of Commissioners) that it is the intent of (the City of/County of) _____ to enforce the latest edition of the following Georgia State Minimum Standard Codes, as adopted and amended by the Georgia Department of Community Affairs: (List below any of the following mandatory codes your jurisdiction intends to enforce.)

International Building Code
International Mechanical Code
International Fuel Gas Code
International Plumbing Code
National Electrical Code
International Fire Code
International Residential Code
International Energy Conservation Code

ORDAINED FURTHER that the following appendices of said codes, as adopted and amended by the Georgia Department of Community Affairs, are hereby adopted by reference as though they were copied herein fully: (List below appendices that your jurisdiction intends to enforce.)

International Building Code: Appendix.....
International Mechanical Code: Appendix.....
International Plumbing Code: Appendix .....
International Fuel Gas Code: Appendix .....
International Fire Code: Appendix.....
International Residential Code: Appendix.....

ORDAINED FURTHER that the following Codes, the latest editions as adopted and amended by the Georgia Department of Community Affairs, are hereby adopted by reference as though they were copied herein fully. It is the intent of (the City of/County of) _____ to enforce the latest edition of the following Georgia State Minimum Standard Codes, as adopted and amended by the Georgia Department of Community Affairs: (List below any of the following permissive codes that your jurisdiction intends to adopt and enforce.)

International Property Maintenance Code
International Existing Building Code
National Green Building Standard

All ordinances or parts of ordinances in conflict with this ordinance are hereby repealed.

This Ordinance shall take effect on _____.

ORDAINED, this _____ day of _____, _____.

_____
(Mayor or Commission Chairman)

Attest:

_____
(Clerk)

(AFFIX CITY/COUNTY SEAL)

GEORGIA DEPARTMENT OF COMMUNITY AFFAIRS

LOCAL CODE AMENDMENT FORM

(For Local Government Use Only)

Item # :	(For DCA use only)			Page:	1	of		
Local Government:				Date:				
Official's Name and Title:				Phone:				
Address:				Fax:				
				Email:				
Title of Code Book:		Code Book Edition:		Code Section:				
CHECK ONE: ☐	Revise section to read as follows:			☐	Add new section to read as follows:			
☐	Delete section and substitute the following:			☐	Delete without substitution:			
~~LINE THROUGH MATERIAL TO BE DELETED:~~				UNDERLINE MATERIAL TO BE ADDED				

Local amendment with strike through and underline :

Complete ordinance section containing local amendment:	Ordinance section # :

GEORGIA DEPARTMENT OF
COMMUNITY AFFAIRS

LOCAL CODE AMENDMENT FORM
INSTRUCTION SHEET

1. A letter must accompany this form requesting the Department of Community Affairs to review the proposes local amendment(s) in accordance with OCGA 8-2-25, and in that letter all other required submitted documentation should be included as required by OCGA 8-2-25.

2. Use a separate form for each proposed local code amendment.

3. "Sheet __1__ of _____" indicates the number of sheets for each individual proposed code amendment, not the number of sheets for all the amendments submitted. If all of the amendment or ordinance section will not fit in the space provided on form please submit remaining parts on additional sheet.

4. Identify the code and code section that is the subject of the proposed local amendment.

5. The local government official's name, address, telephone, fax and email address must be filled out completely.

6. Be sure to indicate the type of recommended action in the space referred to as "Check One".

7. If the proposed amendment revises the language of the code section, deletes the entire code section, or deletes the entire code section and offers substitute language, include the language of the present code section and line through the language to be deleted and underline the language of the proposed amendment..

8. **All proposed local code amendments must be typed and completed in full and the original submitted to the Codes and Industrialized Buildings Section of the Department of Community Affairs.** An incomplete form will be sent back to the proponent for completion.

9. Information concerning submittal of code amendments can be obtained by contacting the Codes and Industrialized Buildings Section at (404) 679-3118. All proposed local code amendments should be submitted to:

The Department of Community Affairs
Codes and Industrialized Buildings Section
60 Executive Park South, NE
Atlanta, Georgia 30329-2231

Appendix E:

Sample Energy Code Enforcement Announcement Letters

GWINNETT COUNTY

Community Energy Code Enforcement Policy

The design and construction of buildings in Gwinnett County for the effective use of energy are regulated by the "Georgia State Minimum Standard Energy Code". Gwinnett County is granted authority by sections 8-2-26 and 8-2-27 of the Official Code of Georgia Annotated to administer the "Georgia State Minimum Standard Energy Code" for all construction located within the county except for incorporated cities. The International Energy Conservation Code, published by the International Code Council and adopted by the state of Georgia with Georgia Supplements and Amendments, constitutes the official "Georgia State Minimum Standard Energy Code", herein referred to as "the energy code". The energy code contains the mandatory requirements for buildings which establish the basis for this policy.

Responsible parties engaged in construction activities including but not limited to contractors, design professionals, and homeowners must comply with the energy code for both residential and nonresidential projects. Design, erection, construction and alteration of any building or interior space are typical activities which must be completed in accordance with the energy code.

The Department of Planning and Development actively enforces the energy code through plan review, permitting, and inspection of construction projects as described in the sections which follow.

Residential Building Energy Code Compliance

Prior to issuance of a building permit, residential contractors must submit to the department a completed **"**Affidavit for Residential Dwellings – Compliance with the Georgia State Energy Code**"** for each residential building and building addition to be constructed including single-family residences, townhomes, and duplexes. The contractor must select one of the following compliance methods on the affidavit:

1. GA State Amendments Table 402.1.1 Insulation and Fenestration Requirements by Component (Climate Zone 3)

2. RECA IECC Compliance Guide for Homes in Georgia based on GA State Amendments Table 402.1.1 (Climate Zone 3).

3. REScheck – Refer to GA State Amendments Table 402.1.4 for minimum R-values and maximum U-factors/SHGC allowed in REScheck. (REScheck is an energy code compliance software program developed by the U.S. Department of Energy.)

4. An Energy Code Compliance Table approved by Gwinnett County Building Construction Section.

5. IECC Section 405 Simulated Performance Alternative using REMRate, Energy Gauge.

The contractor must indicate the following product performance data on the affidavit:

- Flat ceiling insulation R-value.
- Sloped ceiling insulation R-value.
- Wall cavity insulation R-value.
- Wall sheathing insulation R-value.
- Mass wall basement insulation R-value.
- Attic knee wall insulation R-value.
- Floor insulation R-value over unconditioned space.
- Window U-factor.
- Window SHGC value.
- Heating efficiency % for furnaces.
- Cooling efficiency SEER for air conditioning equipment.

The contractor must also comply with the following additional residential energy code requirements:

- Heating and cooling equipment sized per Air Conditioning Contractors of America (ACCA) Manual J.
- Duct design per ACCA Manual D with R-8 insulated ducts in unconditioned attics.
- The energy code requires the posting of a permanent certificate in a readily accessible location on or near the electrical distribution panel or air handler. The certificate must be completed by the contractor or a registered design professional which lists the energy performance data for the installed insulation, windows, water heaters, and mechanical air handling equipment.

Energy code compliance is monitored by the structural, mechanical, and electrical Inspectors during appropriate stages of construction prior to issuance of the Certificate of Occupancy. In particular, department inspection staff routinely observe each building and building addition to verify that the insulation, windows, ductwork, furnaces, water heaters, and air conditioning equipment installed during construction are consistent with the product performance data stated on the affidavit.

Commercial and Multifamily Building Energy Code Compliance

Prior to issuance of a building permit, the building designer (Architect and/or Engineer) must submit construction drawings for each proposed commercial and multifamily building and building addition to the department for energy code compliance review which include an Energy Code Compliance Report for Envelope, Mechanical, and Electrical Interior

Lighting. The Energy Code Compliance Report must document compliance of the proposed construction by one of the following methods:

1. COMcheck – Georgia Code Version
2. COMcheck – ASHRAE 90.1 (2007) Standard Code Version

(Note: COMcheck is an energy code compliance software program developed by the U.S. Department of Energy).

Department plan review staff review the construction drawings for each proposed building and building addition to ensure that the following energy code performance documentation is included prior to authorizing issuance of a building permit:

- Attic ceiling insulation R-value.
- Flat roof insulation R-value.
- Sloped ceiling insulation R-value.
- Wall cavity insulation R-value.
- Wall sheathing insulation R-value.
- Mass wall insulation R-value.
- Floor insulation R-value over unconditioned space.
- Window/Fenestration U-factor.
- Window/Fenestration SHGC value.
- Cooling efficiency SEER/EER/HSPF/COP/AFUE for each mechanical air handling unit.
- Interior lighting schedule indicating watts per sq. ft. of each fixture.
- Insulation R-values for ductwork in unconditioned spaces and for all piping that serves as part of the heating or cooling system.
- Time-scheduling or occupant-sensing devices for automatic control of interior lighting in all spaces for buildings which exceed 5,000 square feet in area.
- Manual or occupant sensor controls for interior lights for each room/space depending upon floor area.

Energy code compliance is monitored by the structural, mechanical, and electrical inspectors during appropriate stages of construction prior to issuance of the Certificate of Occupancy or Certificate of Completion. In particular, department inspection staff routinely observe each building and building addition to ensure that the insulation, windows/fenestration, ductwork, water heating equipment, mechanical air handling units, and interior lighting and lighting controls installed during construction are consistent with that specified on the construction drawings authorized for issuance of a building permit.

Important Notice:

June 1, 2011

Effective July 1, 2011 Certified Duct and Envelope Tightness (DET) Testing will be required as defined in the 2009 International Energy Conservation Code (IECC) to include State Amendments. Prior to issuance of a certificate of occupancy for any new One and Two Family Dwellings, **permitted on or after July 1, 2011**, the fully completed compliance certification form will be required to be on file with the Building Department. This is in addition to the one that is required to be permanently attached to the electrical distribution panel. The required form will soon be available on the Community Development web page under the building permit portion of the permits and applications tab. The following individuals are allowed to test and verify:

A certified Home Energy Rating Systems (HERS) rater
A certified Home Performance contractor with Energy Star
A Building Performance Institute (BPI) Analyst
An individual that has successfully completed a certified DET verifier course that is approved by the Georgia Department of Community Affairs.

If the scope of an addition, alteration, renovation or repairs to an existing residential building or building system requires DET testing, as outlined by the code, verification may also be required. Cobb County does not currently conduct residential plan review and therefore relies on the information provided to the permitting office by the permit applicant. Therefore it may be determined by the inspector, after work has begun, that the testing and verification is required. It is recommended that the scope and requirements are strictly reviewed by the owner and the applicant, prior to permitting, to determine if the testing and verification is required.

In conjunction with and limited to residential construction, including renovation and addition projects, Cobb County will be requiring an insulation inspection as well. This inspection must be requested after the framing inspection has passed and prior to any interior wall or ceiling covering being installed. As with the DET testing, the insulation inspection will only be required on residential permits obtained on or after July 1, 2011.

Where a residential building is classified as R-2, such as attached townhomes and condominiums, testing and verification of the building envelope will be required as outlined in section 402.4.2.2. (*DCA amendment*), which includes an exception allowing field verification in lieu of the envelope tightness testing that is required for One and Two Family Dwellings. If any of the required inspections, including the insulation inspection, are not conducted and passed by a County Inspector the other testing protocol listed in section 402.4.2.2 (*DCA amendment*) will be required. Duct Tightness testing is required to be tested and certified in the same manner as One & Two Family Dwellings.

As with any other adopted code, total compliance with the code is required by the owner and permit holder even if portions of the code are not verified to be compliant by a Cobb County inspector. Cobb County will also continue to require the Energy Code Affidavit that has been in place for several years.

AUGUSTA LICENSE & INSPECTION DEPARTMENT

ROBERT H. SHERMAN, III
DIRECTOR
1815 MARVIN GRIFFIN ROAD
P. O. BOX 9270
AUGUSTA, GEORGIA 30906

BUILDING PERMITS	(706) 312-5050	FAX: (706)312-4277
BUSINESS LICENSE	(706) 312-5053	FAX: (706)312-5037
ALCOHOL LICENSE	(706) 312-5038	FAX: (706)821-4253
CODE ENFORCEMENT	(706) 312-5049	FAX: (706)821-4253

www.augustaga.gov

TO: **ALL CONTRACTORS**

FROM: **MARSHALL MASTERS**

DATE: **JULY 25, 2011**

RE: **ENERGY CODE COMPLIANCE STATEMENT AND REQUIRED DUCT BLAST TEST AND BLOWER DOOR TEST**

All new residential homes permitted on September 1, 2011 will require the Energy Code Compliance Statement to be installed on the electrical panel or air handler.

This form will be in a peel and stick label and will be provided at the time of permitting. The blanks on the form will be completed by the builder or his representative.

You will also be provided a form that is to be completed by the person that has performed the duct and envelope testing (blower door test). They will be required to complete this form and fax it with a copy of their certification to the number listed on the form. **NO** certificate of occupancies will be issued without this form.

In the event that the duct and envelope testing are performed by separate individuals simply mark through which section you did not test and fax the form as requested. Upon receipt of the duct and envelope testing and all completed inspections the Certificate of Occupancy will be issued.

Augusta GEORGIA
www.augustaga.gov

AUGUSTA LICENSE & INSPECTION DEPARTMENT

ROBERT H. SHERMAN, III
DIRECTOR
1815 MARVIN GRIFFIN ROAD
P. O. BOX 9270
AUGUSTA, GEORGIA 30906

BUILDING PERMITS	(706) 312-5050	FAX (706)312-4277
BUSINESS LICENSE	(706) 312-5053	FAX (706)312-5037
ALCOHOL LICENSE	(706) 312-5038	FAX (706)821-4253
CODE ENFORCEMENT	(706) 312-5049	FAX (706)821-4253

I _____ certify that I have performed the duct and envelope tightness testing at _____.

- Building Envelope Tightness (BET):

  BET Test conducted by: _____ Phone: _____
  Fan Flow at 50 Pascals = _____ CFM_{50} Total Conditioned Volume: _____ ft^3
  ACH50=CFM_{50}x60 / Volume= _____ ACH_{50} (must be less than 7 ACH_{50})
  Low rise Multi-Family Visual Inspection Option
  (The visual inspection option may be conducted by a third-party instead of the BET test for R-2 buildings only.)
  Visual Inspection Conducted By: _____ Phone: _____

- Duct Tightness Test Conducted By: _____ Phone: _____
  CFM_{25} per 100 ft^2 of conditioned floor area = CFM_{25} x 100 / Conditioned floor area served

  If all ducts are not located within conditioned space, builder must verity that either the post construction duct leakage to outdoors (PCO) is ≤ 8 cfm / 100 ft^2, the post construction total duct leakage (PCT) is ≤ 12 cfm / 100 ft^2, or the rough-in test (RIT) with air handler Installed is ≤ 6 cfm / 100 ft^2. State which method was used to conduct the duct tightness test: duct blower (DB), modified blower subtraction method (MBDS), or automated multipoint blower door (AMBD).

System	Method (DB, MBDS, AMBD)	Test (PCO, PCT, RIT)	CFM_{25}	Area Served (ft^2)	Test Results

- Check Type of Certification

☐ Home Energy Rating Systems (HERS)
☐ Home Performance with ENERGY STAR contractor
☐ Building Performance Institute Analyst (BPI)
☐ Completed a certified DET verifier course that is approved by the Georgia Department of Community Affairs.

Please fax this form to 706-312-4277 with a copy of your certification. No Certificate of Occupancy will be issued without this form and a copy of the certification.

_____ _____
(SIGN) (DATE)

Georgia Residential Energy Code Compliance Certificate*

Builder/Design Professional: _____ Phone: _____

Envelope Summary

- List the R-Value for the following components:

Flat Ceiling / Roof: _____ Sloped/Vault Ceiling: _____
Exterior Wall: _____ Above Grade Mass Wall: _____
Attic Kneewall: _____ Attic Kneewall Sheathing: _____
Basement Stud Wall: _____ Basement Continuous: _____
Crawlspace Stud Wall: _____ Crawlspace Continuous: _____
Foundation Slab: _____ Floors Over Unconditioned Space: _____
Cantilevered Floor: _____ Other Insulation: _____

Sticker supplied by Richmond CTY

- Fenestration Components:

Window U-Factor: _____ Window SHGC: _____
Skylight U-Factor: _____ Skylight SHGC: _____
Glazed Door U-Factor: _____ Opaque Door U-Factor: _____ (<50% glazed)

- Building Envelope Tightness (BET):

BET test conducted by: _____ Phone: _____
Fan Flow at 50 Pascals = _____ CFM_{50} Total Conditioned Volume: _____ ft^3
$ACH_{50} = CFM_{50} \times 60 / Volume$ = _____ ACH_{50} (must be less than 7 ACH_{50})
Low Rise Multi-Family Visual Inspection Option
(The visual inspection option may be conducted by a third-party instead of the BET test for R-2 buildings only.)
Visual Inspection Conducted By: _____ Phone: _____

Mechanical Summary

Water Heater Energy Factor: _____ EF Fuel Type: ☐ Gas ☐ Electric ☐ Other
Number of Heating and Cooling Systems: _____
Heating System Type (Choose One):
☐ Gas: _____ AFUE ☐ Air-Source Heat Pump: _____ HSPF
☐ Other: _____ Efficiency: _____
Cooling System Type (Standard DX, Heat Pump, Geothermal, etc.): _____
Cooling System Efficiency: _ ☐ SEER ☐ EER ☐ Other
Heating / Cooling Load Calculations Performed By: _____ Phone: _____
Total Heating Load (Based on ACCA Man. J or other approved methodology): _____ BTU/H
Total Cooling Load (Based on ACCA Man. J or other approved methodology): _____ BTU/H
Cooling Sensible Load: ____ BTU/H Cooling Latent Load: _____ BTU/H
Total Air Handler CFM (based on design calculations): _____ CFM
Duct Tightness Test Conducted By: _____ Phone: _____
CFM_{25} per 100 ft^2 of conditioned floor area = $CFM_{25} \times 100$ / Conditioned floor area served

If all ducts are not located within conditioned space, builder must verify that either the post construction duct leakage to outdoors (PCO) is ≤ 8 cfm/100 ft^2, the post construction total duct leakage (PCT) is ≤ 12 cfm/100 ft^2, or the rough-in test (RIT) with air handler installed is ≤ 6 cfm/100 ft^2. State which method was used to conduct the duct tightness test: duct blower (DB), modified blower subtraction method (MBDS), or automated multipoint blower door (AMBD).

System	Method (DB, MBDS, AMBD)	Test (PCO, PCT, RIT)	CFM_{25}	Area Served (ft^2)	Test Result
1					
2					
3					

* Note: This permanent certificate shall be posted on or in the electrical distribution panel or air handler. Certificate shall be completed by the builder or registered design professional. Where there is more than one value for each component, certificate shall list the value covering the largest area.

Appendix F:

Residential Permit Application from City of Acworth requiring DET Verification by Building Department

City of Acworth
Community Development Department

4415 Senator Russell Avenue
Acworth, Georgia 30101
Office: (770) 974-2032
Fax: (770) 974-4421
www.acworth.org

RESIDENTIAL BUILDING PERMIT APPLICATION

All contractors are required to have a Georgia Contractor's License and a business license!

*Note: A separate permit is required for each and every building or structure on which work is to be done. If building contains more than (1) dwelling unit, list the addresses or all units in which work will be done.

Expiration of Permits: All permits expire 6 months after the last required inspection that has been passed, or 6 months after the date of issue if no required inspections have been approved. The Building Official may issue a 6 month extension if any permit, (for due cause), if requested in writing by the permit holder prior to such a permit expiring.

THE FOLLOWING ITEMS MUST BE ATTACHED TO THE APPLICATION BEFORE ZONING AND THE BUILDING DEPARTMENT WILL APPROVE YOUR PERMIT.

1. **Front Elevation (Include a full set of plans for Plan Review) (Reduced to 8 $^1/_2$" X 11" or 8 $^1/_2$" X 14")** _____
2. **Foundation plan (Reduced to 8 $^1/_2$" X 11" or 8 $^1/_2$" X 14")** _____
3. **Floor Plan for Each Floor (Reduced to 8 $^1/_2$" X 11" or 8 $^1/_2$" X 14")** _____
4. **Proposed House Location Survey** _____
5. **Energy Compliance Sheet and Affidavit** _____
6. **Cobb County Water and Sewer Installation Permit Paid Receipt** _____

Stipulations from Plat to be attached by Building Department before issue.

Location / Street Address: _____

Subdivision / Complex: _____ **Lot / Apt. #:** _____

Owner Name: _____ **Phone:** _____
Address: _____ **Mobile:** _____
City: _____ **State:** _____ **Zip:** _____ **Fax:** _____

Contractor: _____ **Phone:** _____
Address: _____ **Mobile:** _____
City: _____ **State:** _____ **Zip:** _____ **Fax:** _____

Electrical Utility Provider: Acworth Power ( ) GA. Power ( ) Cobb EMC ( )

HOUSE PLAN & ELEVATION _____

HEATED SQUARE SQ.FT. (Including Finished Basements): _____
ATTACHED GARAGE SQ.FT. /UNFINISHED BASEMENT SQ. FT.: _____
TOTAL SQUARE FOOTAGE: _____ **CONSTRUCTION COST/VALUATION: $** _____

BASE FEE: _____ **$ 50.00**
PERMIT COST: $5.00 per $1,000 (or any portion thereof) OF TURN KEY VALUATION OF CONSTRUCTION (See Page 2**)** **$** _____
ENVELOPE TIGHTNESS VERIFICATION (BLOWER DOOR TESTING) **See Page 2 for More Information** **$ 150.00**
RECREATIONAL IMPACT FEE: _____ **$ 500.00**
TOTAL COST: _____ **$** _____

RE-INSPECTION FEES: Trade Inspections - $50.00 each occurrence, Envelope Tightness Verification - $150.00 each

Work Commencing Without a Permit: Where any work for which a permit is required is started without such a permit having been issued, the applicable fees shall be doubled. (This includes permits for Building, Electrical, Plumbing, Mechanical, Gas Etc.) The payment of such a double fee shall not relieve any persons from fully complying with the requirements if all applicable codes and City Ordinances including on work already performed, concealed or otherwise not inspected, nor shall it relieve them from any other penalties as may be prescribed by law.

I hereby certify that I have read and examined this document and know the same to be true and correct. All provisions of laws and ordinances governing This type of work will be complied with whether specified herein or not. Granting of a permit does not presume to give authority to violate or cancel the provisions of any other state or local law regulating construction or the performance of construction.

_____ _____ **DATE**
CONTRACTOR OR AUTHORIZED AGENT - PRINT NAME **SIGNATURE OF CONTRACTOR OR AUTHORIZED AGENT**

Envelope Tightness Verification: $150.00 for each test. $100.00 per hour to diagnose the worst areas of air leakage upon request (not required). Re-evaluating after initial test failure shall be at the same original cost(s).

The Envelope Tightness Verification shall be performed along with the required Duct Tightness Verification, together during one inspection. If called for separately, additional fees shall apply.

The provisions of the Georgia State Minimum Standard Energy Code, as adopted and amended the Georgia Department of Community Affairs, shall regulate the design of building envelopes for adequate thermal resistance and low air leakage, as well as the design and selection of mechanical, electrical, service water heating and illumination systems and equipment that will enable the effective use of energy in new building construction. **Any duct or envelope tightness verification or testing required by this Code shall be performed by the City of Acworth Building Department.** For due cause, the Building Official may hire or allow an outside contractor to perform such testing. If a builder, owner or contractor elects to perform (or hires an outside contractor to perform) any such duct or envelope tightness verification / testing, the results of such testing shall not be made mandatory upon the Building Official for his acceptance as meeting the requirements of this Code. The building and/or heating and air conditioning contractor shall be charged fees for such duct and envelope tightness verification / testing in accordance with the permit fee schedule on file with the City. Failures in meeting the provisions the Code concerning duct and envelope tightness shall result in the testing being required to be performed again, after corrections to deficiencies have been made, and a re-inspection fee in the original amount has been paid. Upon request, and upon the payment of an additional fee, the Building Department shall perform analysis to attempt to determine the cause of the failure of a duct tightness and / or envelope tightness tests.

The air tightness of the building, dwelling or dwelling unit(s) shall be performed in accordance with Code and after all rough-in inspections have been approved, after the installation of all exterior and interior wall coverings and after installation of all penetrations of the building envelope, including doors and windows and penetrations for utilities, plumbing, electrical, ventilation, combustion appliances, etc.

The **Total Cost of Construction** (permit valuations) shall include the total cost of the building, electrical, gas, mechanical, plumbing, necessary equipment, and other systems, as required to erect and complete the building, dwelling or structure, including design fees, connection to utilities, site work necessary for foundation installation, the cost of materials, labor, overhead and profit.

FOR OFFICE USE ONLY

BASE APPLICATION ACCEPTED BY: _____
PLANS CHECKED BY: _____
ZONING APPROVAL: _____ **TAX PARCEL NUMBER:** _____
APPROVED FOR ISSUANCE BY: _____

Live Load: _____ **Construction Type:** _____ **Occupancy Type:** _____

Stipulations / Comments

_____

_____

_____

_____

_____

_____

_____