

[Sustain]able
Atlanta



**Removing Barriers to
Compliance: Energy Code
Compliance Task Force
Recommendations**

Published February, 2012

Compiled by A. Synkai Harrison LEED AP BD+C

Contents

ACKNOWLEDGEMENTS	3
INTRODUCTION	5
RESIDENTIAL RECOMMENDATIONS.....	5
Compliance Verification	5
Energy Modeling	6
Tradeoff Method/REScheck	7
Prescriptive Path	7
Energy Code Compliance Certificate.....	7
HVAC Permit Submittal Requirements and Final Inspection	7
Inspector Cross Training and Inspection Consolidation.....	8
Policy Recommendation for the Building Envelope.....	8
Phase in Awareness of Requirements.....	9
COMMERCIAL RECOMMENDATIONS.....	10
Compliance Verification	10
Simulated Energy Performance Analysis (Energy Modeling).....	10
Tradeoff/COMcheck.....	11
Prescriptive	11
ADDITIONAL RECOMMENDATIONS:	12
Energy Code Interpretation:	12
Metrics	13
Appendix A	15
Appendix B	16

ACKNOWLEDGEMENTS

This material is based upon work supported by the Department of Energy under Award Numbers EE0000801. City of Atlanta Mayor’s Office of Sustainability provided continued support throughout this project. City of Atlanta Office of Buildings provided data and gave permission to review plans and follow along on code inspections. Members of the Energy Code Compliance Steering Committee and Taskforce volunteered their time and expertise in the development of this document.

Energy Code Compliance Steering Committee:

City of Atlanta Office of Buildings	Anthony Carter
City of Atlanta Office of Buildings	Ainsley Caldwell
American Society of Heating Refrigeration, Air Conditioning Engineers (ASHRAE)	Steve Ferguson
Atlanta Apartment Association	Penelope Round
Atlanta Board of Realtors	Robert Broome
Council for Quality Growth	Wylly Harrison
Dillard & Galloway	Laurel David
Greater Atlanta Homebuilders	David Ellis
Greater Atlanta Homebuilders	Dennis McConnell
Georgia Power	Willie Palmer
Kimley-Horn	Angela Priest
Mosaic Group	William Fadul
Real Estate Logistics Group	Charlie Fiveash
Selig Enterprises	Bonnie Dean
Selig Enterprises	Kevin Curry
Sustainable Atlanta	Nancy Geisler
VeenendaalCave, Inc.	Mark Schroeder

Energy Code Compliance Task Force:

City of Atlanta Office of Buildings	Anthony Carter
City of Atlanta Office of Buildings	Ainsley Caldwell
American Society of Heating Refrigeration, Air Conditioning Engineers (ASHRAE)	Steve Ferguson
Atlanta Apartment Association	Penelope Round
Barrett, Woodyard & Associates, Inc.	Steven Brewer
Coro Realty Advisors LLC	Patti Pearlberg
Gables Residential	Dave Skelton
Georgia Power	Jeff Smith
Greater Atlanta Homebuilders	Dennis McConnell
Mosaic Group	William Fadul
Mosaic Group	Rick Goldstein
Newcomb Boyd	Robert Howell
Philips Partnership	Christina Roberts
Selig Enterprises	Kevin Curry
Southface	Mike Barcik
Southface	Denise Grimm
US Green Building Council	Carl Seville
VeenendaalCave, Inc.	Mark Schroeder

Facilitators:

Sustainable Atlanta	Synkai Harrison
Southface	Robert Reed
Southface	Diana Burk

Disclaimer:

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government, nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

INTRODUCTION

Sustainable Atlanta and Southface convened a steering committee of experts from the commercial and residential real estate industry to provide input for the effective implementation of the Georgia State Supplements and Amendments to the International Energy Conservation Code 2009 Edition and ASHRAE IESNA Standard 90.1-2007. The Energy Code Compliance Steering committee selected a team of technical experts to form a taskforce representing their various stakeholder groups. The Energy Code Compliance Taskforce provided their experience and expertise in developing recommendations to reduce the barriers to energy code compliance and enforcement contained in this document. The Taskforce worked primarily in two separate teams: residential and commercial. The topics addressed in this paper cover administration, enforcement and metrics to track the progress of compliance.

RESIDENTIAL RECOMMENDATIONS

The residential team discussed the challenges to energy code enforcement based on their professional experience and developed the following recommendations as a means to improve compliance and enforcement of the Georgia State Supplements and Amendments to the International Energy Conservation Code 2009 Edition.

The team provided recommendations on:

- Development of three paths for compliance verification
- Enforcement of the Georgia energy code’s requirement for a compliance certificate
- Required submission of the following for HVAC permits and Final Inspections:
 - ACCA Manual J load calculations
 - ACCA Manual D duct sizing calculations
 - Duct tightness test report
- Transition to a single inspector system
- Establishment of a policy to strengthen building envelope renovation requirements

The current Georgia energy code, the Georgia State Supplements, and Amendments to the International Energy Conservation Code 2009 edition, herein will be referred to as the “energy code”.

Compliance Verification

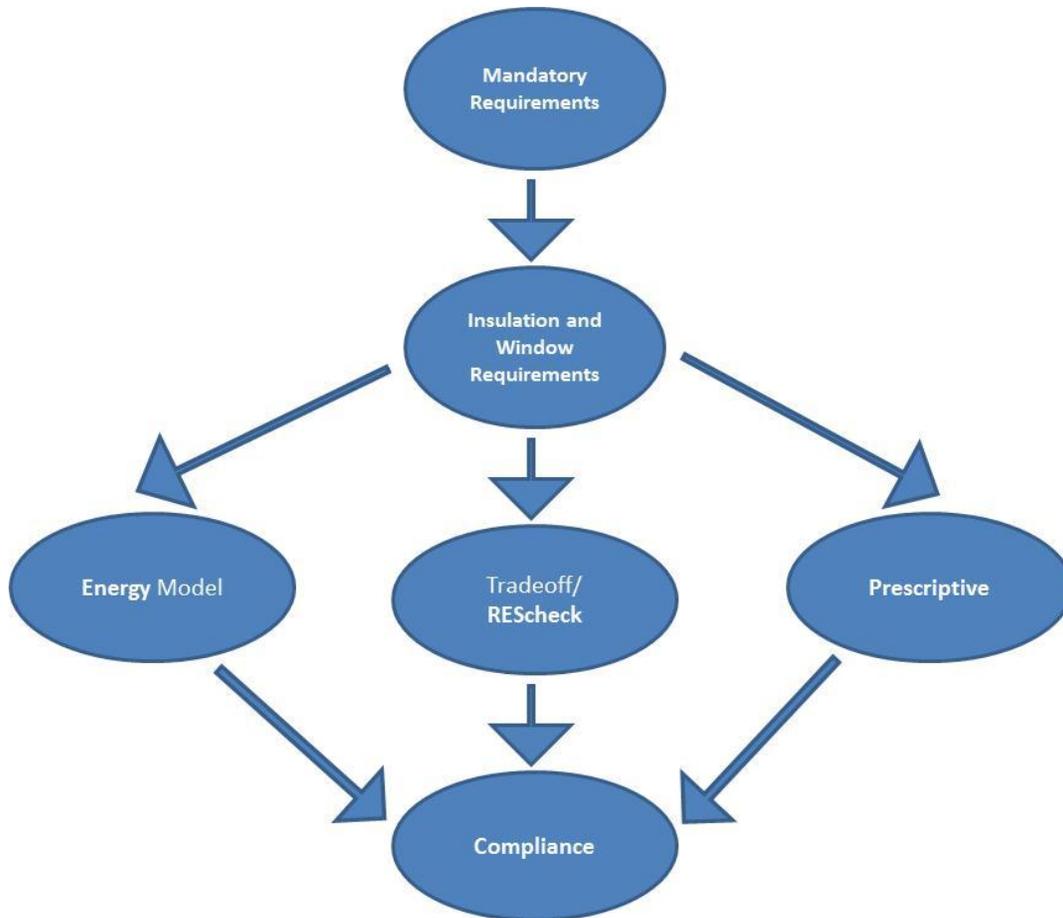
It is recommended that the Office of Buildings should utilize three paths to verify that the design of a single family home achieves compliance with the energy code:

- Simulated energy performance analysis (Energy Modeling)
- Tradeoff/REScheck
- Prescriptive

Figure 1: Energy Code Compliance Pathways

The diagram below illustrates the three pathways allowed in Georgia’s energy code. The most common pathway is prescriptive. This is pathway gives exact insulation and window requirements a builder must use to meet the requirements in the energy code. The “Tradeoff/REScheck” pathway allows builders to conduct simple trade-offs (e.g., use lower levels of ceiling insulation but improve windows) using [REScheck™](#), a free software tool. The simulated energy performance analysis or energy modeling pathway is the most complicated approach. This pathway allocates total allowable energy use for a building, as determined by modeling software, and the builder chooses the materials to meet

this target. No matter which pathway a builder takes, the mandatory requirements in the energy code must be met. (e.g., duct and envelope testing)



Energy Modeling

As stated above the energy modeling pathway allocates a total allowable energy use for a building, as determined by modeling software and the builder chooses the materials he prefers to meet this target. One of the most common examples of energy modeling software for residential use are those accredited by the Residential Energy Services Network (RESNET), a not for profit membership organization. RESNET is a national standards making body for building energy efficiency rating systems. RESNET standards are recognized by the mortgage industry, the financial industry, and the Environmental Protection Agency's ENERGY STAR program, LEED for Homes, Earthcraft House and other green home certification programs. The Home Energy Rating System (HERS®) Index is a scoring system established by RESNET. HERS raters are individuals who are certified by an accredited HERS Provider to inspect, test, and evaluate a home for the minimum features established by the HERS Index. HERS raters must complete extensive training with an accredited HERS provider to achieve certification. The rater analyzes a home's construction drawings utilizing energy efficiency software and performs field inspections to prepare a certified HERS rating and, where applicable, ensure that the home meets ENERGY STAR guidelines. In addition, HERS raters are one of the certifiers approved to perform duct and envelope tightness verification testing by the state of Georgia. Once the home is completed, a HERS rater is capable of verifying to the best of their knowledge and belief that the home complies with Georgia's energy code. If the builder elects to pursue the energy modeling pathway, it is recommended that submission of the energy modeling report, generated by software approved by the Director of the Office of Buildings, be required before the CO is awarded. In addition, builders should be allowed the option of a Temporary Certificate of Occupancy (TCO) if the HERS rating has not been completed in time for the final inspection. If a TCO is awarded, the HERS rating should be submitted within 60 days of the final inspection.

Tradeoff Method/REScheck

The Department of Energy defines the trade-off method as an approach that allows trading enhanced energy efficiency of one building component for decreased energy efficiency in another component.¹ The REScheck is a free and easy to use software tool available from the Department of Energy that automates the trade-off calculations and verifies that a residential project's design is in compliance with the 2009 International Energy Conservation Code. It is a simple tool that can be completed by anyone with a basic understanding of building science. The tool is available in a desktop version and a web based version. Each can be accessed at www.energycodes.gov.

REScheck will generate a report detailing the trade-offs utilized for a specific project. This report should be submitted to the Office of Buildings when applying for a building permit on all residential projects utilizing the tradeoff method. The REScheck report must indicate that the structure complies with the energy code by receiving a "passing" result.

Additionally the corresponding project specific checklist generated by REScheck should be submitted as well and utilized by the appropriate inspector.

Prescriptive Path

The majority of projects follow the prescriptive path. If a project team elects to follow the prescriptive path, an energy code compliance checklist provided by the Office of Buildings should be required when applying for a residential building permit for all new construction, additions, and major renovations. If any changes are made to design specifications during construction, an updated version should be submitted to the Office of Buildings prior to the insulation and air sealing inspection. Included with these recommendations is a checklist based on the DOE Climate Zone 3 Residential checklist and the Georgia Residential Energy Code Compliance Certificate contained in Appendix D of the Georgia State Supplements and Amendments to the IECC 2009 Edition.

Energy Code Compliance Certificate

The Energy Code Compliance Certificate (ECCC) is a mandatory requirement of Georgia's energy code. The ECCC lists basic insulation values, window values, load calculations and testing results. The ECCC is a permanent document that must be posted on or near the air handler or electrical distribution panel. This requirement should be strictly enforced per Section 410 of the energy code. If the permitted work only includes the mechanical systems or the building envelope, the portion of the ECCC that applies to the work should be completed. A copy of the certificate should be submitted to the Office of Buildings prior to final inspection or awarding of a Certificate of Occupancy and kept on file with all permit submittals. Field inspectors must verify that the information contained in the ECCC is accurate and all code requirements are installed properly or verified independently by a HERS rater.

HVAC Permit Submittal Requirements and Final Inspection

A load calculation in accordance with ACCA Manual or other approved methods is used to determine heating and cooling loads. Load calculations are a mandatory requirement in the energy code. Equipment selected using this calculation helps to ensure indoor comfort, moisture control, and extend the life of the equipment. Conducting a load calculation is also required by the 2006 International Residential Code (IRC 2006 sec. M1401.3) and 2009 IECC (sec. 403.6).

When HVAC equipment is being installed in new construction, or being replaced in an existing building, the load calculation report should be submitted prior to the approval of an HVAC permit. This requirement should be strictly enforced. It is recommended that the Office of Buildings implement a grace period to phase in the load calculation

¹ US Department of Energy, Building Energy Codes Program, Residential Compliance FAQs (http://www.energycodes.gov/support/res_compliance_faq.stm)

documentation requirement. To provide an incentive for submitting the load calculation during the grace period, it is recommended that building permits whose corresponding HVAC permit includes a load calculation be eligible for expedited permitting or some other appropriate incentive.

Duct system design in accordance with ACCA Manual D or other approved methods is also required by the International Residential Code (IRC 2006 sec.M1601.1). Once the industry has become accustomed to the new submittal and inspection process, it is recommended that the Office of Buildings begin phasing in the submission of a duct design calculation as required by 2006 International Residential Code. This would be required when applying for an HVAC permit to install a new system and duct work or replacing more than or equal to 50 percent of the duct work. The duct design would be subject to the same review and oversight as the load calculation. Additionally, the Office of Buildings should consider certification of HVAC installers who may forgo submittal requirements upon achieving an industry certification, passage of a test approved by the Director of the Office of Buildings, and intermittent audits. The Office of Buildings should give ample time for the majority HVAC installers to achieve this certification.

Duct tightness verification is now a requirement under Georgia's energy code. Under section 403.2.2 of Georgia State Supplements and Amendments to the IECC 2009 Edition, when new ducts are installed, or greater than or equal to 50 percent of existing duct work is modified, a duct pressurization test report is required. This report should be submitted to the Office of Buildings prior to final inspection of the HVAC equipment. In new construction due to scheduling challenges, it may not be possible to obtain the results of a duct pressurization test prior to the final inspection. In these cases, it is recommended that the Office of Buildings issue a TCO pending the results of the test. Building permits whose corresponding HVAC permit includes a load calculation should be eligible for expedited permitting or some other appropriate incentive. Since the approval of a residential HVAC permit usually takes one business day, the Office of Buildings should consider providing an incentive for those projects that elect to submit load calculations during the grace period but are applying only for an HVAC permit.

Interpreting and verifying the results of a load calculation report can be a challenging process. Verification should be done by a qualified mechanical engineer or an individual with deep experience in mechanical systems. It is recommended that the Office of Buildings engage a mechanical design professional to interpret load calculation and duct design reports. This individual also could potentially assist in reviewing energy model summaries. The mechanical design professional should train applicable Office of Buildings staff on how to effectively analyze the HVAC design submittals. The professional could be hired as a consultant for one year or longer if the Director of Buildings deems it appropriate. Once the inspection staff has been adequately trained, then the position could be phased out.

Inspector Cross Training and Inspection Consolidation

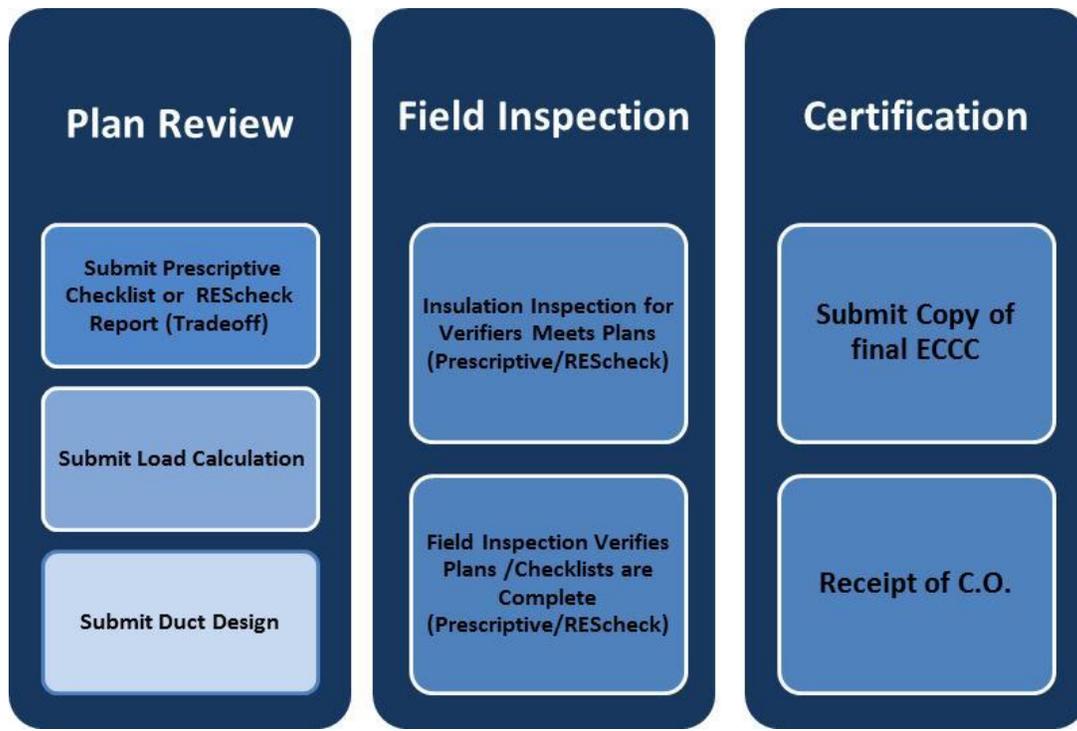
For a typical residential project, four rough inspections are required after the framing inspection: plumbing, electrical, HVAC and insulation. Separate inspections of each building system typically take several days and multiple site visits depending on the project. To effectively enforce the code, it is essential that a building inspector have an understanding of how each part impacts the building as a whole. Each of these systems is interrelated within the energy code. It is recommended that the Office of Buildings transition to a single inspector system by which each inspector would be cross trained to inspect for energy, building and mechanical code compliance. Having a single inspector would greatly increase the effectiveness of energy code enforcement; provide better service to contractors and save the Office of Buildings money by reducing the number of trips to each site.

Policy Recommendation for the Building Envelope

The Georgia energy code currently states that, only when all drywall is removed from an existing building, should the building envelope be brought up to code. When it is apparent that a builder is attempting to skirt the energy code by leaving a minimal amount of drywall, the Office of Buildings should require that the entire building envelope be brought up to code, and the building pass the envelope tightness requirement.

Figure 2: Energy Code Compliance Process Recommendation Summary - Residential

The following diagram summarizes many of the recommendations above and how they would be incorporated into the Office of Building’s plan review and inspection process.



Phase in Awareness of Requirements

To effectively enforce these recommendations, the City of Atlanta must strive to inform and educate not only Office of Buildings staff but also industry professionals regarding the changes to and benefits of energy code enforcement. A phased approach involving an education period, an incentive period, and increased enforcement should be utilized.

The Office of Buildings should sponsor training for industry professionals on the requirements of the new permit application process and what to expect during an inspection. In addition, training on load calculations and duct design submittal requirements should be provided for residential HVAC contractors. The following figure displays a sample timeline wherein the recommendations, specifically those regarding the load calculation and duct design submittal requirements, can be smoothly implemented.

Figure 3: Energy Code Compliance Phase in Timeline



COMMERCIAL RECOMMENDATIONS

Our commercial energy code compliance team was comprised of professionals representing commercial building owners, managers, developers, the multifamily sector and the mechanical design profession.

The team discussed the challenges to energy code enforcement based on their professional experience and developed the following recommendations as a means to improve compliance and enforcement of ASHRAE 90.1-2007 and the Georgia State Supplements and Amendments to the International Energy Conservation Code 2009 Edition.

The following recommendations address:

- Building Design Aspects Summary and Affidavit (or the IECC prescriptive compliance)
- COMcheck Report (for ASHRAE 90.1 prescriptive or building envelope trade-off compliance path)
- Energy Performance Simulation
- Administrative recommendations

Compliance Verification

The Office of Buildings should utilize three paths to verify that the design of a commercial building achieves compliance with the energy code:

- Energy Modeling
- Tradeoff/COMcheck
- Prescriptive

Simulated Energy Performance Analysis (Energy Modeling)

In the case of more complicated projects, the Office of Buildings should accept a copy of an Energy Model Summary from software preapproved by the Director of the Office of Buildings as proof that the building's design complies with the energy code. An energy performance simulation report will not necessarily provide a tool to verify compliance in the field. In this instance, the field inspector should inspect for mandatory requirements of the energy code and verify that

the project was built according to the approved drawings. A COMcheck report should not be required when an energy model is performed.

Tradeoff/COMcheck

The Georgia Commercial Energy Code allows for two compliance paths: IECC 2009 and ASHRAE 90.1-2007. The DOE provides a commercial version of its free energy code compliance software tool known as COMcheck™. When using this tool the user can select a Georgia specific energy code option. Under the current version of COMcheck neither the IECC 2009 option nor the Georgia specific option reflect the more stringent requirements of Chapter 5 of the 2011 Georgia amendments. As a result they cannot be used. The Office of Buildings should require only projects utilizing ASHRAE 90.1-2007 submit a COMcheck report. COMcheck will display an alert stating that ASHRAE 90.1-2007 must be used when a user selects the Georgia option. The Office of Buildings staff should make sure customers are aware of this prior to submitting a COMcheck report. COMcheck can be used on less complicated commercial projects either with the prescriptive or tradeoff methods when using ASHRAE 90.1. COMcheck is a simple tool that most individuals with a basic understanding of building science can use and would not be overly burdensome to do so. An added benefit is that COMcheck can create project specific reports that provide a standardized project specific documentation trail that building inspectors can also use to verify compliance in the field.

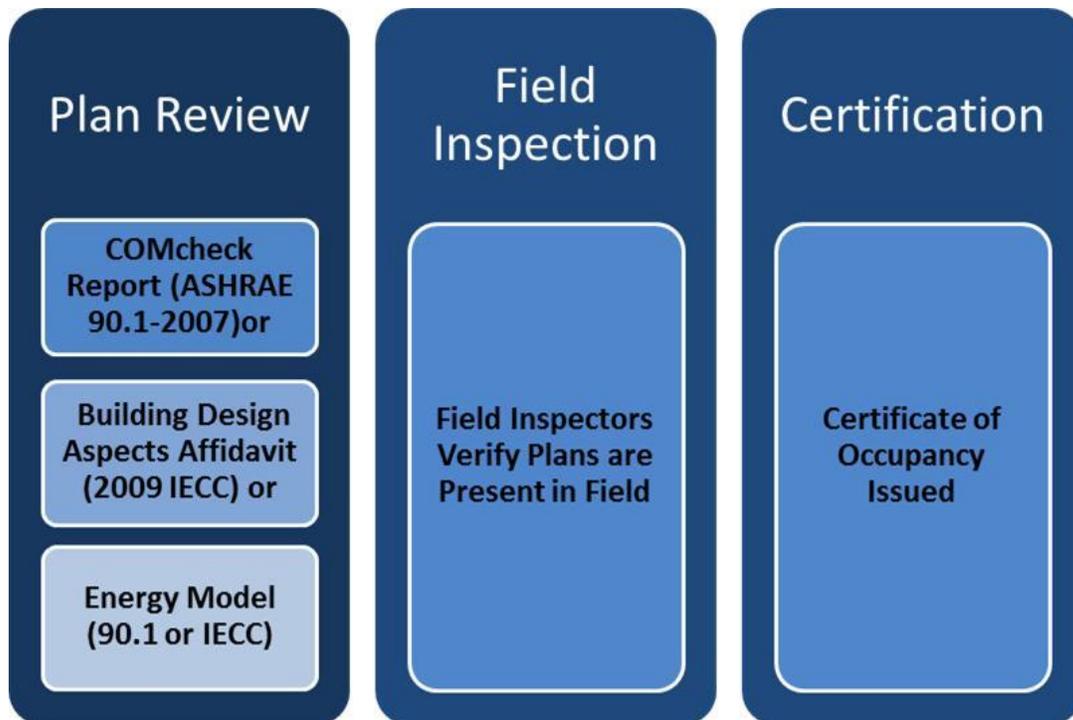
If simple trade off energy code compliance software comes to the marketplace that incorporates the more stringent requirements of Georgia's energy code, then the Office of Buildings should consider those products for use, if deemed appropriate by the Director of the Office of Buildings.

Prescriptive

When following the prescriptive path under ASHRAE 90.1, a COMcheck report should be required for all projects when applying for a commercial building permit in order to provide a standardized documentation trail.

Since COMcheck cannot be used when utilizing the IECC 2009 prescriptive compliance path; the Office of Buildings should require a detail listing of how the project meets the prescriptive requirements in IECC 2009. The permit application should include appropriate documentation of energy code compliance by the design professionals for each aspect of the building (building envelope, electrical power, lighting systems, and mechanical systems). The permit application should also include an affidavit stating that the project, to the best of the designer's knowledge and belief, is in compliance with IECC 2009. The documentation required to verify compliance should be determined by the Office of Buildings.

Figure 4: Energy Code Compliance Process Recommendation Summary - Commercial



ADDITIONAL RECOMMENDATIONS:

- The Office of Buildings should designate specific staff members to provide assistance to the department’s customers in the use of REScheck and COMcheck. A computer workstation with COMcheck and REScheck installed should be provided for customers to use as needed.
- Continue to provide professional development training for plan reviewers and inspectors.
- Implement an audit process of inspections and plan review by randomly inspecting the work of Office of Building’s staff. The results of these spot inspections should not change the results of any previously approved inspections.
- The Office of Buildings should perform random Duct and Envelope Tightness tests of homes at the final inspection to ensure that the DET verifiers are performing the tests correctly.
- Establish an ad hoc Building Code Interpretation Committee to address reoccurring questions regarding the interpretation of building codes currently enforced.
- Create a handbook of official code interpretations and post all code interpretation rulings on the Office of Buildings website.

Energy Code Interpretation:

The taskforce requests that the Office of Buildings provide an official interpretation of the following issues:

- Replacement cost vs. market value: Section 3403.1 of the Georgia State Amendments to the International Building Code (rev. 2007) states “When the estimated cost of the new work is less than 50 percent of the replacement cost of the existing system or building, the new work shall be brought into conformance with the requirements of the State Minimum Standard Code for new construction. 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.” The taskforce requests that the Office of Buildings adopt the policy of adhering to this section of the building code. A reasonable replacement cost should be determined by a Certified Cost Consultant (CCC) or Certified Cost Engineer (CCE) retained by the project team. If the project team chooses not to have the replacement cost determined by CCE or CCC then the Office of Buildings could default to the tax assessed or market value.

- Renovations of office space within industrial building types and ASHRAE 90.1-5.8.1.8: Section 5.8.1.8 of ASHRAE 90.1 states that roof insulation shall not be installed on a ceiling with removable ceiling panels. Office spaces within industrial/warehouse building types were not contemplated when the thermal envelope requirements were implemented. The taskforce had extensive discussions on the challenges and expense of complying with this section of ASHRAE as interpreted by many local jurisdictions. Sustainable Atlanta on behalf of the Energy Code Compliance Taskforce has submitted a proposed amendment to the Georgia Department of Community Affairs to address this issue. The amendment recommends a trade-off for an exception to this section of ASHRAE 90.1 and reads as follows:
 - EXCEPTION: In buildings in climate zone 3 existing as of the effective date of this code, ceilings between conditioned space and semi-heated space (table 3.1) meeting all of the following conditions:
 1. Submittal from the design professional that to the best of their knowledge, information and belief the semi-heated space is in compliance with table 3.1
 2. All lighting within the semi-heated space must meet the requirements of ASHRAE 90.1-2010.
 3. Where roof replacement is not part of the scope of work and not contemplated within one year.

REASON/INTENT: Office spaces within industrial/warehouse building types were not contemplated when the thermal envelope requirements were implemented. Building science research into this particular condition is lacking. Strict enforcement of these requirements will place an undue financial burden on a market segment whose adaptability is necessary for competitive economic development. Measures taken to comply in the wide variety of conditions existing in the market segment will have varying effectiveness. The exception is at least as protective of the intent of the code and in most cases will provide more effective delivery of energy efficiency.

Additionally, industry professionals are experiencing inconsistent enforcement of this requirement which will unfairly affect communities with effective code enforcement. Further, the high tenant turnover rates and the “50% rule” give owners multiple opportunities to implement future code enhancements.

It is not intended that suspended ceilings ever be seen as part of an effective air barrier but rather that mandatory introduction of an alternate air barrier prior to the most effective solution (above deck insulation upon re-roof with a full height enclosing wall) creates an unnecessary burden that may be overcome when seen as a progression to an improved end-state.

The taskforce requests that the Director of the Office of Buildings support this amendment.

Metrics

The following are a list of recommended metrics that will assist in verifying that the city of Atlanta is moving towards the goal of 90 percent compliance with IECC 2009 and ASHRAE 90.1-2007 by 2017. This data can also be used to develop policies that will promote and expand high performance building within the city of Atlanta. For data that is captured by the Office of Buildings, the department should establish a system where queries could be made according to data below.

Residential

1. Track the number of projects that use REScheck and energy modeling during the submittal process.
2. Track the inspection failure rate for specific issues related to the energy code.
3. Track the building's envelop performance according to REScheck
4. Record the grade and type of insulation
5. Record the building envelope and duct leakage rates from the results of DET testing
6. Record the load calculation and duct design results (Manual J & Manual D)
7. Record the above data by project type: new construction, renovation, additions and multifamily.

Commercial

1. Track the percentage of projects that use COMcheck and energy modeling during the submittal process.
2. Track the inspection failure rate for specific issues related to the energy code.
3. Track each percentage of a building's envelope and lighting performance according to COMcheck.
4. Record the building types according to the Commercial Buildings Energy Consumption Survey and track the square footage of those buildings. *See Appendix A*

Appendix A

Categories from Commercial Building Energy Consumption Survey² (see footnote for definitions):

- Education
- Food Sales
- Food Service
- Health Care
- Lodging
- Mercantile
- Office
- Public Assembly
- Public Order and Safety
- Religious Worship
- Service
- Warehouse and Storage
- Other
- Vacant

² US Energy Information Administration, Description of CBECS Building Types http://www.eia.gov/emeu/cbecs/building_types.html

Appendix B

Residential Energy Code Checklist

Permit Number: _____ Date: _____

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

Building Name & Address: _____

Conditioned Floor Area: _____ ft²

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

Green Building/Above-Code Program: _____

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 and photos on 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.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.1.1 402.2.7 303.2	Basement wall exterior insulation R-value ³ . Basement wall exterior insulation depth. Basement wall exterior insulation installed per manufacturer's instructions	Continuous: R-5 10 ft. or to basement floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.2.9 303.2	Crawl space wall insulation R-value. Crawl space wall insulation installed per manufacturer's instructions.	Continuous: R-5 Cavity: R-13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.2.9	Crawl space continuous vapor retarder installed with joints overlapped by 6" and sealed, and extending at least 6" up the stem wall.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
303.2.1	Exposed foundation insulation protection.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.8	Snow melt controls.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Additional Comments/Assumptions: _____

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, 402.5 303.1.3	Door U-factor. ⁴ Glazing (window) U-factor (area-weighted average). ⁵ Glazing labeled for U-factor (or default values used).	U-0.50 Impact Rated: U-0.65	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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) ⁶	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.1.1 303.2	Mass wall exterior insulation R-value. Mass wall exterior insulation installed per manufacturer's instructions.	R-5 ⁷	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.2.1	Ducts outside of building thermal envelope insulated	Attic Supply: R-8 Other: R-6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.2.4	Ducts and connection to AHU sealed with mastic.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.2.3	Building cavities NOT used for supply or return ducts.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.5	Air-tight IC-rated recessed lighting fixtures meet infiltration criteria.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.3	HVAC piping insulation.	R-3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.4	Circulating hot-water piping insulation.	R-2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.5	Dampers installed on all outdoor intake and exhaust openings.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.4	Glazed fenestration air leakage.	0.3 cfm/ft ²	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.4	Swinging door air leakage.	0.5 cfm/ft ²	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.4	Fenestration and doors labeled for air leakage.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Additional Comments/Assumptions: _____

⁴ One side-hinged door up to 24 ft² can be exempted from the prescriptive door U-factor requirements. Exemption cannot be applied to attic access.

⁵ Up to 15 ft² of glazed fenestration, including skylights may be exempted from U-factor and SHGC requirements under the prescriptive approach.

⁶ SHGC mandatory maximum using trade-offs.

⁷ 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			Comments/Assumptions
			Y	N	N/A	
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: ⁸ See footnote	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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: ⁹ R-8 Steel: ¹⁰ See footnote	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.2.11 303.2	Sunroom ceiling insulation R-value. Sunroom ceiling insulation installed per manufacturer's instructions.	R-19	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.1,402.4.2	Air-seal tubs and showers		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.1,402.4.2	Air-seal window/door openings		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.1,402.4.2	Air-seal assemblies separating garage		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.1,402.4.2	Air-seal bottom plate and top plate		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.1,402.4.2	Air-seal seams in exterior sheathing		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.1,402.4.2	Air-seal utility penetrations		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.1,402.4.2	Air-seal dropped ceiling and chases		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.1,402.4.2	Air-seal rim joist junction		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.1,402.4.2	Air-seal attic knee wall		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.1,402.4.2	Air-seal stairs to unconditioned basement		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Additional Comments/Assumptions: _____

⁸ Floor steel frame equivalent: R-19+R-6 in 2x6 or R-19+R-12 in 2x8 or 2x10

⁹ If more than ½ the insulation is on the exterior, mass wall exterior insulation requirement applies (R-5).

¹⁰ Wall steel frame equivalent: R-13+R-5; R-15+R-4; R-21+R-3; R-0+R-10

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 ft².	Wood: R-30 Steel Truss ¹¹ Steel Joist ¹²	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.1.1	Attic knee wall insulation R-value with attic-side air barrier.	R-18	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.2.1.1	Wind wash baffle and dam for air-permeable insulation.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.2.3	Access hatch and door insulation and weather-stripping.	Hole cover: R-19 Vertical doors/stairs: R-5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.6.1	Electric-resistance heat NOT used as the primary heat source.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
404.1	Lighting - 50% of lamps are high efficacy or controlled via an occupancy or vacancy sensor.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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 %	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.6	HVAC loads calculations and air handler cfm on compliance certificate.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
402.4.3	Site built masonry wood burning fireplace - gasketed doors and outdoor air for combustion.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.1.1	Programmable thermostats installed on forced air furnaces.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.1.2	Heat pump thermostat or lockout device		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

¹¹ Steel truss equivalent: R-38; R-30+R-3; R-26+R-5.

¹² Steel joist equivalent: R-38 in 2x4 or 2x6 or 2x8; R-49 in any framing.

	installed on heat pumps.					
403.4	Circulating hot water systems have automatic or accessible manual controls.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.9	Pool heaters, covers, and automatic or accessible manual controls.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
403.10	Power attic ventilators NOT connected to the electric grid.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Additional Comments/Assumptions: _____