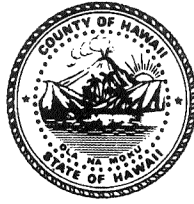


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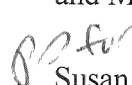
HAWAI'I COUNTY COUNCIL
25 Aupuni Street, Hilo, Hawai'i 96720

2019 DEC 16 PM 2:22
COUNTY CLERK
COUNTY OF HAWAII

MEMORANDUM

DATE: December 16, 2019

TO: Aaron S.Y. Chung, Chairperson;
and Members of the Hawai'i County Council

FROM:  Susan L.K. Lee Loy, Council Member

SUBJECT: Bill No. 126; An Ordinance amending Chapter 5, Article 5, Section 5-84, of the Hawai'i County Code 1983 (2016 Edition, as amended), relating to energy conservation.

Attached please find the following:

- 1) A table of the public comments received by the Department of Public Works on the County's proposed amendments to the International Energy Conservation Code, the justification for the comments, and the Department's response;
- 2) Images of attendance at the topic-focused workshops on October 28-29, 2019; and
- 3) An updated overview of where we are in the amendment process.

Please distribute copies of this memo for the discussion on Bill No. 126 at the December 17, 2019, meeting of the Public Works and Mass Transit Committee.

SL:ps

Prescriptive Commercial		
Comment	Justification	Action
Maintain current IECC 2015.	Maintains meeting the State's energy goals of 2045.	The community recognizes that further refinement of the IECC is required. The current IECC failed to consider the unique needs of Hawai'i Island and contained some arbitrary thresholds. Amendments will be carefully considered.
Blower door testing too restrictive.	Need further refinement and more information.	Similar to Maui County, the department has refined this subsection of the IECC. Justification and comments are contained at Subsection C402.5. Similar amendment is also provided in the residential section at table R402.4.1.1.
Certificate of Occupancy or Final Inspection should clarify condition and unconditioned space.	Should the commercial space be renovated and/or redefined it would assist on what baseline the IECC was met and assist if there is a need to address with refined calculations.	Investigation is needed to determine applicability. Construction documents/job site copies will indicate the scope of work which includes conditioned and unconditioned spaces.
Add definitions for clarification i.e. code official, conditioned space, unconditioned space, habitable space	There are references within the code for undefined terms.	New definitions are included to the proposed amendments.
Amendment C101.4 applicability and C103.1 general are in conflict	The amendment to C101.4 gives the code official the authority to determine which code requirements shall prevail while the amendment to C103.1 compels the licensed professional to certify that the project complies with the code. Unless the code official documents every applicability case and distributes these to every design professional a design	The general applicability of the code through the amendment process attempts to address any potential conflicts. Should conflicts arise, the building official has the latitude to make a determination. Documentation of such conflicts is a reasonable expectation. Design professionals, should there be a question of applicability, have the opportunity to

	professional cannot be expected to infer applicability.	discuss these with the building official.
C102.1 General (alternative materials) revise “lower” to “alternative”	The intent of the code is not to lower the minimum standard but to allow for alternative but equal solutions.	This is agreeable and updated.
C103.1 General provide an easier more general compliance block.	To make it easier for design professionals a general compliance block would be more appropriate.	The current compliance block highlights what methods are used to meet the intent of the code. The current proposed block acts as a checklist for design professionals, plan reviewers and inspectors to refer and quickly check the plans based on what methods for compliance. To efficiently process permits the current proposed block is appropriate.
C103.1 General, Exception: any work not requiring a design professional the owner shall certify compliance.	Please insert owner certification verbiage to be placed on construction drawings. The inclusion of a certified statement would bring about some efficiency in the permit process and eliminate the need for resubmission by the owner.	HCC Chapter 5 requires design professionals to certify commercial projects. The owner certification would be more appropriate, as applicable, to the residential exception and will be amended.
C106.4: Wherever in this Code reference is made to the International Mechanical Code, the provisions in the International Mechanical Code shall be deemed only guidelines and not mandatory.	The above paragraph matches Hawai‘i County Code Chapter 5, Section 5-12 (3). Recommend inserting this into the IECC to ensure there is not a conflict on whether the IMC is a guideline vs. requirement.	The proposed amendment to the IECC for Article 5 under the HCC Chapter 5 already makes this reference.
Add exception to C402.1.1 4. Those that are located at elevations between 400 feet and 3,000 feet above sea level that do not contain conditioned space.	This amendment would make Hawai‘i County consistent with the national code in the areas where passive conditioning works and still be consistent with the State amendments for the more extreme lower and higher elevation. This amendment will promote passive unconditioned	Investigation and modelling are required to qualify the 400 foot and 3,000 foot elevation thresholds. Creating a blanket exception beyond the intent of the State code for passive conditioning of public spaces (commercial buildings) with unique building types for various

	buildings rather than assuming that air conditioning will be added to all buildings. The 3,000 foot elevation is set so that most sites in Waimea fall within the zone, which promotes passive heating and cooling.	occupancies requires further investigation.
C402.1.1 exception 2 is opposed		The department requires more investigation and is considered revising exception 2 in future amendments. The department is aware of the significant financial impact of bringing an unconditioned space to compliance after the space becomes conditioned.
C402.1.1 add exception 4: Buildings, or portions thereof, conditioned with "spot cooling" type air conditioning systems intended to provide only local relief to building occupants.	Spot cooling systems are used in industrial spaces or kitchens and intended to reduce energy consumption compared to conventional AC systems. These systems are typically sized at a fraction of the capacity of the total space conditioning load and the building envelope has little to no effect of energy use.	The department requires more support and investigation into the statement that the "building envelope has little to no effect of energy use." Modeling to justify this would support the proposal.
Table C402.1.3 Prescriptive options should allow for unconditioned or partially conditioned with reflective U barriers (metal roof pain, or other reflective roofing covers, reflective barriers, including closed foam foil wrapped insulation in the above framed deck, not just stating R12.5ci.)	It is assumed that the proposal is to allow for U-factor systems as alternatives to the 12.5ci for group R occupancies.	The model code table C402.1.4 has allowances for U-factor values for assemblies. Furthermore, C102.1 allows for the building official to consider alternative materials that meet the requirements. Details of built systems and U factor calculations would be required to show compliance. No action required.
Table C402.4 U factor and for designed natural air flow to be NR;	Low energy use solar mechanical fans	Area weighted U factor (UA per C402.4.3.4 allows for design strategies to

SHGC not be required		meet or exceed the minimum requirement prescribed in the code. Reductions of SHGC are allowed with Projection factors
C402.5 air leakage thermal envelope It makes it sound like the blower door test is optional. However, even as the amendments are written the thermal envelope must comply with Sections C402.5.1 through C402.5.8 OR the blower door test plus Sections C402.5.5, C402.5.6, and C402.5.7.	In the national code the blower door test is a way to avoid tested and labeled fenestration. This is good since it would then allow for site built windows and other high performance custom solutions. Changing shall to may creates some confusion; are Sections C402.5.1 through C402.5.4 now optional?	Revised the language for the required air leakage test as an option for compliance for tested and labeled fenestrations
C402.5.2 Air leakage testing. Add exception 3: Jalousie windows shall not be required to meet the requirements of Table C402.5.2 provided these are located in non-conditioned space.	Eliminating jalousie window requirement to be consistent with residential amendments.	The department will consider the applicability for commercial spaces.
C405.2 Lighting controls, table of lighting fixtures for smaller commercial buildings or additions, list all LED lights together when under 500W; list all LED when over 500W or other lights, state each fixture wattage		Lighting control exceptions are allowed with the designed lighting power densities are less than 70% of the densities specified in Table C405.4.2(1) and Table C405.4.2(2). Design professionals are required to provide adequate justification to qualify for the exception.
C403.2.7 Energy recovery ventilation systems, delete in entirety.	Energy recovery ventilation systems due to moderate temperatures in many areas of the Big Island, especially in the east side, energy recovery provides minimal energy savings due to the low delta T between exhaust and outside air.	The department will consider the deletion of this section.
C403.2.8 Kitchen exhaust systems. Delete in entirety.	Most kitchens do not have conditioned make up air or replacement air. Placing limits on maximum exhaust rates is not recommended or effective.	ASHRAE limits are identical to IECC requirements. The department will investigate this further.

C503.2 Change in space conditioning amend language to: Where a non-conditioned or low energy space is altered to become a conditioned space, any existing envelope components shall be made to comply if the opportunity exists to bring such components into compliance with this code. Existing walls or ceiling exposed as part of construction shall be made to comply if the opportunity exists to bring the assemblies into compliance.	Conditioning existing non conditioned spaces is almost entirely impossible to comply with.	The department is considering the effects of this amendment and may include it in future amendments.
Prescriptive Residential		
Comment	Justification	Action
Do not allow the use of attic fans, regardless of energy source.	It would increase energy cost which is contrary to the IECC and meeting the State's energy goals of 2045.	Similar to Maui County, the department has refined this subsection of the IECC. Justification and comments are contained at Subsection R503.1.1. This amendment provides an alternative compliance path which addresses the cost issue while reaching to meet the State's energy goal of 2045.
Need to allow for alternative of radiant barriers	As the larger building industry becomes familiar with the use of the IECC, this community will become innovative with various product types to address costs and need.	This amendment is consistent with the version adopted by the State and Kaua'i County. Justification and comments are contained with the utilization of the Points Option and are noted on Table R407.1
Develop amendments to that are region/climate specific for Hawai'i Island	Hawai'i Island has 11 climate zones, however the IECC only has 2.	Climate zones as defined in the IECC, higher than the Tropical zone and Climate zones 1A and 1B require more stringent prescriptive methods. The department will reference Table R402.1.2 for equitable enforcement.
Elevation limit on Tropic Zone	This number was arbitrary and no	The department is committed to seeking

	rationale was given or provided by the author of this code.	input on the modification of this arbitrary limit and developing a rational nexus to modify this portion of the code.
Increase the size limit of conditioned spaces to 2,000 sq. ft.	1. Use the similar language from the model code; 2. Clarify the definition which helps provide consistency in understanding for all users of the code.	The department is currently reviewing this number to ensure consistency with the code and other funding sources like HUD to accelerate funding opportunities for all types of housing.
		The department is currently working on refining definitions for this and all the codes. This will assist both the users and the department with consistent application of all the codes for code compliance.
Add a provision to reduce R-value	Use the point system to reduce R-value	Section R407 makes allowances for insulation reductions. R405 allows for performance modeling offering design considerations to meet the minimum intent of the code. Further prescriptive insulation reductions require modeling and investigation.
Add in a line for homeowner signature on exception.	Keep the language consistent with Hawai'i Revised Statutes (HRS) Chapter 464	The department is currently reviewing all the permit application forms and where necessary will be modifying the application forms.
		The department will also look at providing more education and outreach to the homeowner and/or contractor on sections of HRS 464 and the requirements contained therein.
Develop amendments that alterations/additions/changes of use are	Keep costs affordable, especially for those modifying for the needs of kūpuna or	Amendments will be carefully considered with the understanding of special

done with a rational nexus to the percentage of the whole space.	health reasons.	circumstances.
R401.2 Clarify R401.3 is required for all compliance paths		Amendments have been updated
R401.3 Certificate add: The certificate shall indicate which areas have been designed and constructed as conditioned or unconditioned space; The certificate shall include the following text: “The addition of mechanical cooling or heating to an unconditioned space requires a building permit. The addition of cooling without proper design and construction can have adverse health, safety, and conservation consequences.”	The certificate should clearly indicate which areas of the dwelling have been designed and construct as unconditioned space and which areas have been designed and constructed as conditioned space. The certificate should also include a notice to the dwelling owner of occupant regarding addition of cooling to unconditioned spaces.	The department concurs that the home owners should be made aware of conditioned and unconditioned spaces. Text was added as a requirement.
R402.1 General- add exception 4: those located at elevations between 400 feet and 3,000 feet above sea level that do not contain conditioned space.	There are many areas on Hawai'i Island where a properly sited and designed building does not require mechanical conditioning. Passive heating and cooling should be promoted.	Further investigation, analysis and modeling are needed to justify the elevation limits. Expanding Tropical zone limits are a compromise to promote passive cooling.
R402.1.3 Define what is and isn't included	Should not include lanais, enclosed not habitable areas?	Clarified with adding the definition “habitable,” and added “habitable” areas less than 1100 to section R402.1.3
R402.4.1.2 Testing Propose: Buildings or dwellings units with 5 tons or more of cooling installed shall be tested and verified as having air leakage rate not exceeding five air changes per hour. Testing shall be conducted in accordance with ASTM E 799 or ASTM E 1827 and reported at a pressure of 0.2 inch wg. Testing shall be performed at any time after creation of all penetrations of the	Dwellings that utilize significant amount of mechanical cooling, air leakage have a significant impact on performance.	The department continues to consider this as a requirement prior to issuing a final inspection approval. Mandating compliance to a test prior to issuing a final inspection approval prior to occupancy is a challenge for the division. Having design professionals specify the requirement for the owner keeps the owners involved and accountable.

building thermal envelope		
R402.1.2 Testing Proposed language: The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding five air changes per hours when all of the following conditions are met. Testing shall be conducted in accordance with ASTM E 779 or ASTM E 1827 and reported at a pressure of 0.2 inch w.g. Testing shall be performed at any time after creating of all penetrations of the building thermal envelope. 1) the building or dwelling unit is below 2,400 feet above sea level, 2) More than one half of the dwelling unit area is air conditioned, 3)The building or dwelling unit's habitable space is greater than 1,500 square feet in size.	The use of the word “may” is confusing. Air leakage tests are not new. Small houses waste less energy so they don't need a test, Houses at higher elevations typically don't need A/C so they don't need a test. Houses with A/C in bedrooms (less than one half of the habitable space) don't need a test.	The department continues to consider this as a requirement prior to issuing a final inspection approval. The conditions are a good compromise for the requirement of a test. Mandating compliance to a test (required by conditions) prior to issuing a final inspection approval prior to occupancy is a challenge for the division and the inspection staff. Having design professionals specify the requirement for the owner keeps the owners involved and accountable.
R403.5.5 Solar water heating; Solar water heating systems are required for new single-family residential construction pursuant to HRS 196-6.5. If an on-site photovoltaic power system is providing at least 80 percent of the dwelling unit electrical power then electric tank or on-demand electric water heaters will be permitted.	Provide provisions for alternative water heaters if the dwelling has a photovoltaic system providing at least 80 percent of electrical power.	A blanket approval of electric water heaters would not comply with the requirement of solar hot water heaters per HRS 196-6.5. Variances via department of business, economic development and tourism utilizing PV may allow for such allowances.
Service water heating; Piping insulation Table C403.2.10 implies full length, C404.4 implies 8 ft. propose 1” insulation on full length of hot water pipe and omitting the maximum length requirement		Per C404.4 Insulation of piping from a water heater to the heated water fixture shall be insulated (full length). Table C403.2.10 specifies the insulation thickness depending on temperature and

altogether.		pipe size. The 8 feet is specific to the insulation of heat traps for water heater storage tanks.
Table C402.4 note (a) buildings located less than 23.5 degrees latitude shall use SEW for all orientations; omit exception for north facing walls.		Note (a) of Table C402.4 excludes Hawai'i from the exception. The department considered the north facing window exception appropriate for Hawai'i and removed the latitude qualifier.
Tropical Commercial		
Comment	Justification	Action
Limit to commercial space to 5,000 sq. ft.	Consistent with the need for fire sprinklers systems	5,000 sf is a large space; the department limited the Tropical zone for commercial to 2,500 sf.
C401.2 Propose limiting square footage (5,000 sf) and cooling tonnage (5 tons) to the Tropical zone amendment.	Larger commercial buildings or commercial buildings with significant cooling loads may have a similar configuration to a residential use but due to scale their use intensity cannot be compared to a single-family or duplex dwelling use. Limits would make it easier for the code official to be consistent in their acceptance of this exception.	Consideration was made for this and further amendments will be updated.
R402.1 Thermal envelope; change to none required in wood and mass walls in 85-100% unconditioned natural ventilated house at any SF.		The department expanded the tropical zone elevation to 5000', if the dwelling is <50% conditioned wall insulation is not required in tropical zone, R value for mass wall is exempt per foot note (f) of Table R402.1.2.
Tropical Residential		
Comment	Justification	Action

Clear definitions of 1. Use of ventilations for skylights. 2. Fenestration.	Clarify the definition which helps provide consistency in understanding for all users of the code.	The department is currently working on refining definitions for this and all the codes. This will assist both the users and the department with consistent application of all the codes for code compliance.
Decrease requirement of fenestration from 14% to 10%.	This modification will reduce the cost of construction and allow for use of existing products	The department has allowed for trade offs using the points system of R407.
Modify the elevation from 2,400 to 5,000 feet.	2,400 was an arbitrary elevation. Hawai'i County has residential homes at higher elevations and 5,000 provides greater flexibility meeting the unique needs of our island and the respective climate zones	The department is committed to seeking input on the modification of this arbitrary limit and developing a rational nexus to modify this portion of the code. 5,000 foot elevation includes Waimea, Volcano, and HOVE.
Don't overbuild.	Addressing a square-foot limitation would assist with meeting the goals of the IECC	The department is currently reviewing this suggestion and the opportunities and constraints with housing funding sources like HUD
Consider exceptions for those creating housing currently off the grid.	Encourage those that can afford this type of residence.	The department is currently looking at incentives that encourage residential products that meets the State's energy goal and future opportunities to educate this incentive.
Solar systems on demand	Allow for other product that meet the heating of water which is the highest consumer of energy for residential units.	The state allows for a variance process to address this alternative. The department will visit opportunities with the state to streamline this option.
R401.2.1 amend condition 3: Solar, wind, or other renewable energy sources supplies not less than 90% of the energy for service water heating. If an on-	To allow for on-demand electric or electric tank water heaters if PV provides more than 80% of the electrical power	A blanket approval of electric water heaters would not comply with the requirement of solar hot water heaters per HRS 196-6.5. Variances via department of

site photovoltaic power system is providing at least 80 percent of the dwelling unit electrical power then electric tank or on-demand electric water heaters will be permitted.		business, economic development and tourism utilizing PV may allow for such allowances.
R401.2.1 amend condition 7 to install a radiant barrier.	Providing a radiant barrier can be much more effective in reducing solar radiation through the roof than typical batt insulation.	Table 9 of “Analysis & Proposal of Amendments” provided by DBEDT showed radiant barrier alone does not provided benefit as a cool roof. Radiant barrier plus a cool roof is the most effective in reducing solar radiation. As noted R407 allows for this improvement.
R401.2.1 condition 8 add “habitable”	“The floor area of each room” as noted in the national code and State amendment implies every room no matter how small must be provided with operable fenestration or mechanical fan.	The department concurs adding “habitable” provides clarity.
R401.2.1 (8) clarify equivalent ventilation	For clarification	The department concurs clarification is required and included the 2 ach/hr with the current County of Hawai‘i Chapter 5 “Building” code requirements.
R404.2 Ceiling fans add “habitable” to clarify largest space	For clarification as garages and other non conditioned/non-habitable spaces may qualify as the “largest space”	The department concurs clarification is required and included “habitable.”
Where house is 100% unconditioned in tropical zone, less restrictions apply. Owner to sign off on such, create it so that if an area is condition that is greater than 10% of house it would require a permit similar to a renovation.		The department created an exemption for unconditioned dwellings 1,100 sf or less. Should there be a change from unconditioned to conditioned space, the dwelling will be required to comply.
R401.2.3 Renewable energy source; agricultural low density lots, propane tankless water heaters would be allowed	State low in its current form is good, but should be applied to denser populated areas. Hilo, Kona residential lots.	The water heater exception and variance process is administered by State law and DBEDT. If a proposed water heater is

based upon cost or other constraints.		granted a variance by DBEDT, COH will honor that variance.
401.2.1(4) Glazing. 100% unconditioned house, glazing requirements are not to be required.	A naturally vented house with minimal mechanical usage, low screening should be allowed, low venting single pane windows should be allowed. Higher percentage of wall openings should be required.	SHGC is to limit solar gains, having overhangs help to reduce the heat load. An exception for jalousie windows has been made to be exempt from SHGC requirements as it promotes passive cooling.
Alternative Residential		
Comment	Justification	Action
Add exceptions for “off grid” residents (non-compliance with IECC if residents don’t need/want heating)	Qualifying the alternative program and utilizing the DBET spreadsheet.	The department is currently looking at incentives that encourage residential products that meets the State’s energy goal and future opportunities to educate this incentive.
Residents close to commercial scale to use total building performance as an alternative	The residential prescriptive compliance path may not be sufficient to meet the energy compliance requirements, and the commercial prescriptive path may be too stringent for the residential occupancy.	If the building is a residential building, residential provisions of the IECC shall apply. Commercial buildings shall comply with commercial provisions. Section R405 allows for performance modelling offering design considerations to meet the minimum intent of the code.
R103.1 General, Exception: any work not requiring a design professional the owner shall certify compliance.	Please insert owner certification verbiage to be placed on construction drawings. The inclusion of a certified statement would bring about some efficiency in the permit process and eliminate the need for resubmission by the owner.	HCC Chapter 5 requires design professionals to certify commercial projects. The owner certification would be more appropriate, as applicable, to the residential exception and will be amended.
R503.2 Change in space conditioning Split air conditioner systems where the cost to bring the space into full compliance with this code exceeds a five year payback period based on the	Provide a compliance path for change in space conditioning.	This was considered and developed with a compromise to require the home to be in the tropical zone, less than 50% conditioned, and adding R-19 in the ceiling of the conditioned space.

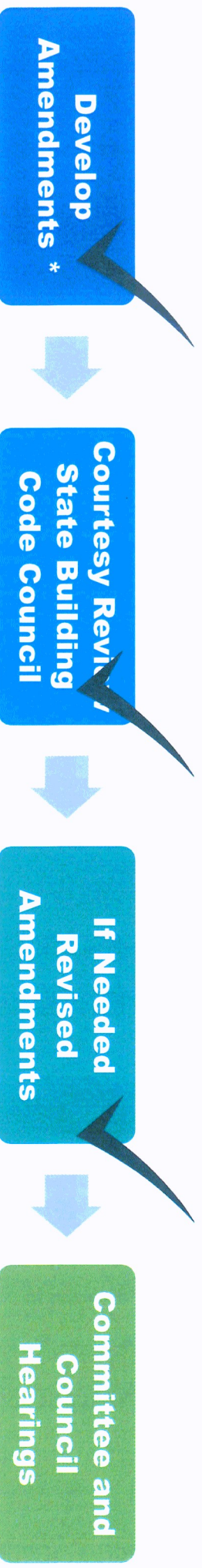
additional energy cost of the added space conditioning system. This exemption is subject to use if a split air conditioner system with a SEER rating in the top 25% of readily available units.		
Table R405.5.2 (1) change roof, wall insulation or reflective so that it aligns with 85-100% unconditioned.		Section R405 refers to simulated performance compliance requiring software. Table R405.5.2(1) are the specifications for the standard reference to model against with that software.
R407 Modify Points table.	Points table and applicability is confusing	The department concurs and made an attempt to clarify required selections and tradeoffs.
R407 Points; Need areas to spend for points earned in tropical zone		The department has added the points trade-off for 14% reduction to 10%.
Points credits in tropical zone should include a way to reduce from R-19 to R10.		Investigation and modeling needs to be provided to further investigate the allowable tradeoffs for R-10 ceiling insulation.
Attic Insulation: Table R405.5.2(1) Propose to align COH Ch 5; attic venting up to the discretion of the design professional.	Attic venting is not desirable in very humid climates.	Table R405.5.2(1) is the baseline specification for the performance modelling compliance path. However, the table was revised to provide a footnote allowing unvented attics to align the IECC with HCC Chapter 5.

Parking Lot

- Overall training needs for inspectors/others utilizing the code for consistency and efficient review and application.
- Look at the overall carbon footprint of all products.
- Zero Code Initiative.



International Energy Conservation Code Hawaii County Amendment Pathway



*Corporation Counsel review of HRS 107-28 (a) county authority and HRS 46-1.5(13) limited authority.