IECC COMMERCIAL COMMITTEE ACTION REPORT ON THE RESULTS ON THE 2021 PUBLIC INPUT CHANGES TO THE INTERNATIONAL ENERGY CONSERVATION CODES-UPDATED 7/19/22

Update July 19, 2022

Attached to this cover are updates to the previously issued IECC Commercial Committee Action Report to properly align with the language acted on by the IECC Commercial Consensus Committee. These include

CEPI-9-21

CEPI-58-21

CEPI-137-21

CEPI-257-21

As per the instructions provided in the CAR your electronic ballot must submitted along with any comment/reason statement emailed to the Secretariat (kstenger@iccsafe.org) by **Monday, August 1 at 11:59 pm Pacific**. If you have further questions or issues with your ballot please contact the Secretariat.

CEPI-9-21

IECC®: SECTION 202 (New), C403.7.5

Proponents: Nicholas O'Neil, representing NEEA (noneil@energy350.com); Kevin Rose, representing Northwest Energy Efficiency Alliance (NEEA) (krose@neea.org)

2021 International Energy Conservation Code

Add new definition as follows:

DEMAND CONTROL KITCHEN VENTILATION (DCKV). A system that provides *automatic*, continuous control over exhaust hood and make-up air fan speed in response to temperature, optical, or infrared (IR) sensors that monitor cooking activity or through direct communication with cooking appliances.

Revise as follows:

C403.7.5 Kitchen exhaust systems. Replacement air introduced directly into the exhaust hood cavity shall not be greater than 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space shall not exceed the greater of the following:

1. The ventilation rate required to meet the space heating or cooling load.
2. The hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered to be that portion of outdoor *ventilation air* not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.

Kitchen exhaust hood systems serving Type I exhaust hoods shall be provided with *demand control kitchen ventilation (DCKV)* controls w~~W~~here a kitchen or kitchen/dining facility has a total Type I kitchen hood exhaust airflow rate ~~is~~ greater than 5,000 cfm (2360 L/s) . ~~,~~ *DCKV* systems shall be configured to provide a minimum of 50 percent reduction in exhaust and replacement air system airflow rates. Systems shall include controls necessary to modulate exhaust and replacement air system airflows in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle operation. ~~e~~ Each hood shall be a factory-built commercial exhaust hood listed by a nationally recognized testing laboratory ~~in compliance with UL 710. Each hood~~ and shall have a maximum exhaust rate as specified in Table C403.7.5 . ~~and shall comply with one of the following:~~

~~1. Not less than 50 percent of all replacement air shall be transfer air that would otherwise be exhausted.~~

~~2. Demand ventilation systems on not less than 75 percent of the exhaust air that are configured to provide not less than a 50-percent reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.~~

~~3. Listed energy recovery devices with a sensible heat recovery effectiveness of not less than 40 percent on not less than 50 percent of the total exhaust airflow.~~

Where a single hood, or hood section, is installed over appliances with different duty ratings, the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the highest appliance duty rating under the hood or hood section.

~~**Exception**~~ **Exceptions:** ~~Where not less than 75 percent of all the replacement air is transfer air that would otherwise be exhausted.~~

1. UL 710 *listed* exhaust hoods that have a design maximum exhaust flow rate not greater than 250 cfm per linear foot of hood that serve kitchen or kitchen/dining facilities with a total kitchen hood exhaust airflow rate less than 5000 cfm (2360 L/s).
2. Where allowed by the *International Mechanical Code*, an *energy recovery ventilation system* is installed on the kitchen exhaust with a sensible heat recovery effectiveness of not less than 40 percent on not less than 50 percent of the total exhaust hood airflow.

Reason: Demand control kitchen ventilation has been commonplace on make-up air hoods for years and has appeared in the IECC since 2015. This proposal clarifies the section by relocating several nested requirements to the charging language and mandating DCKV on hoods of 5000 cfm or greater unless they have an energy recovery device, or are UL-710 hoods with a maximum 250 cfm/lf flowrate or below the 5,000 cfm threshold. This cleans up the section to make it clearer that DCKV is required on most kitchen exhaust hoods and moves less common compliance paths (such as heat recovery and UL 710 listed hoods) to exceptions rather than in the charging language making this provision easier to understand. It also removes the transfer air requirement which is not common on systems above this size threshold to utilize in real world applications.

Cost Impact: The code change proposal will neither increase nor decrease the cost of construction.
Because the threshold for which this applies remains the same for kitchens with a total exhaust airflow of 5,000 cfm there is no expectation that costs will increase. Prior analysis for adding variable speed fans and associated controls have shown an incremental cost of $11,500 regardless of hood size. The 5,000cfm threshold was chosen as the cost-effective breakpoint given the cost and is not changing as part of this proposal.

Workgroup Recommendation
Commercial Energy Committee Committee Action: As Modified
Commercial Energy Committee Reason: Subcommittee referenced reason statement in proposal.

Demand control kitchen ventilation has been commonplace on make-up air hoods for years and has appeared in the IECC since 2015. This proposal clarifies the section by relocating several nested requirements to the charging language and mandating DCKV on hoods of 5000 cfm or greater unless they have an energy recovery device, or are UL-710 hoods with a maximum 250 cfm/lf flowrate or below the 5,000 cfm threshold.

This cleans up the section to make it clearer that DCKV is required on most kitchen exhaust hoods and moves less common compliance paths (such as heat recovery and UL 710 listed hoods) to exceptions rather than in the charging language making this provision easier to understand. It also removes the transfer air requirement which is not common on systems above this size threshold to utilize in real world applications.

CEPI-58-21

IECC®: C402.5, C402.5.1.2, C402.5.2, C402.5.3, C406.9, SECTION 202

Proponents: Mark Lyles, representing New Buildings Institute (markl@newbuildings.org); Gayathri Vijayakumar, representing Steven Winter Associates, Inc. (gvijayakumar@swinter.com); Diana Burk, representing New Buildings Institute (diana@newbuildings.org)

2021 International Energy Conservation Code

Revise as follows:

C402.5 Air leakage—thermal envelope. The *building thermal envelope* shall comply with Sections C402.5.1 through Section C402.5.11.1, or the building *thermal envelope* shall be tested in accordance with Section C402.5.2 or C402.5.3. Where compliance is based on such testing, the building shall also comply with Sections C402.5.7, C402.5.8 and C402.5.9.

C402.5.1.2 Air barrier compliance. A continuous air barrier for the opaque building envelope shall comply with the following:

1. Buildings or portions of buildings, including Group R-2 and I-1 occupancies, shall meet the provisions of Section C402.5.2.

   Exception: Buildings in Climate Zones 2B, 3C and 5C.

2. Buildings or portions of buildings other than Group R-2 and I-1 occupancies shall meet the provisions of Section C402.5.3.

   Exceptions:

   1. Buildings in Climate Zones 2B, 3B, 3C and 5C.
   2. Buildings larger than 5,000 square feet (464.5 m^2) floor area in Climate Zones 0B, 1, 2A, 4B and 4C.
   3. Buildings between 5,000 square feet (464.5 m^2) and 50,000 square feet (4645 m^2) floor area in Climate Zones 0A, 3A and 5B.

3. Buildings or portions of buildings that do not complete air barrier testing shall meet the provisions of Section C402.5.1.3 or C402.5.1.4 in addition to Section C402.5.1.5.

C402.5.2 Dwelling and sleeping unit enclosure testing. The *building thermal envelope* shall be tested in accordance with ASTM E779, ANSI/RESNET/ICC 380, ASTM E1827 or an equivalent method approved by the *code official*. The measured air leakage shall not exceed 0.30 cfm/ft^2 (1.5 L/s m^2) of the testing unit enclosure area at a pressure differential of 0.2 inch water gauge (50 Pa). Where multiple dwelling units or sleeping units or other *enclosed* ~~occupiable conditioned~~ *spaces* are contained within one *building thermal envelope*, each ~~unit~~ shall be considered an individual testing unit, and the building air leakage shall be the weighted average of all test ed~~ing~~ unit results, weighted by the ~~each testing unit's~~ enclosure area of each tested unit. Units shall be tested without simultaneously testing adjacent units and shall be separately ~~with an unguarded blower door test~~ tested as follows:

1. Where buildings have fewer than eight total dwelling or sleeping ~~testing~~ units, each ~~testing~~ unit shall be tested.
2. For buildings with eight or more dwelling or sleeping ~~testing~~ units, the greater of seven units or 20 percent of the ~~testing~~ units in the building shall be tested, including a top floor unit, a ground floor unit and a unit with the largest *testingunit enclosure area*. For each tested unit that exceeds the maximum air leakage rate, an additional two units shall be tested, including a mixture of ~~testing~~ unit types and locations.
3. *Enclosed spaces* with not less than one *exterior wall* in the *building thermal envelope* shall be tested in accordance with Section C402.5.3.

   Exception: Corridors, stairwells, and *enclosed spaces* having a *conditioned floor area* not greater than 1,500 ft^2 (139 m^2) shall be permitted to comply with Section C402.5.1.5 and either Section C402.5.1.3 or Section C402.5.1.4.

C402.5.3 Building thermal envelope testing. The *building thermal envelope* shall be tested in accordance with ASTM E779, ANSI/RESNET/ICC 380, ASTM E3158 or ASTM E1827 or an equivalent method approved by the code official. The measured air leakage shall not exceed 0.40 cfm/ft^2 (2.0 L/s × m^2) of the *building thermal envelope* area at a pressure differential of 0.3 inch water gauge (75 Pa). Alternatively, portions of the building shall be tested and the measured air leakages shall be area weighted by the surface areas of the building envelope in each portion. The weighted average test results shall not exceed the whole building leakage limit. In the alternative approach, the following portions of the building shall be tested:

Exceptions:

1. The entire envelope area of all stories that have any spaces directly under a roof.
2. The entire envelope area of all stories that have a building entrance, exposed floor, or loading dock, or are below grade.
3. Representative above-grade sections of the building totaling at least 25 percent of the wall area enclosing the remaining conditioned space.

Exception: Where the measured air leakage rate exceeds 0.40 cfm/ft^2 (2.0 L/s × m^2) but does not exceed 0.60 cfm/ft^2 (3.0 L/s × m^2), a diagnostic evaluation using smoke tracer or infrared imaging shall be conducted while the building is pressurized along with a visual inspection of the air barrier. Any leaks noted shall be sealed where such sealing can be made without destruction of existing building components. An additional report identifying the corrective actions taken to seal leaks shall be submitted to the code official and the building owner, and shall be deemed to comply with the requirements of this section.

C406.9 Reduced air infiltration. Air infiltration shall be verified by whole-building pressurization testing conducted in accordance with ASTM E779 or ASTM E1827 by an independent third party. The measured air-leakage rate of the building envelope shall not exceed 0.25 cfm/ft^2 (2.0 L/s × m^2) under a pressure differential of 0.3 inches water column (75 Pa), with the calculated surface area being the sum of the above- and below-grade building envelope. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner.

Exception: ~~For buildings having over 250,000 square feet (25 000 m^2) of *conditioned floor area*, air leakage testing need not be conducted on the whole building where testing is shall be conducted on representative above-grade sections of the building. Tested areas shall total not less than 25 percent of the conditioned floor area and shall be tested in accordance with this section.~~ *Buildings* tested in accordance with Section C402.5.2 where the weighted average of all tested unit results is not greater than 0.20 cfm/ft^2 ~~(1.0 L/s x m^2)~~ at a pressure differential of 0.2 inch water gauge (50 Pa).

TESTING UNIT ENCLOSURE AREA. The area sum of all the boundary surfaces that define the *dwelling unit*, *sleeping unit* or ~~occupiable~~ *conditioned enclosed space* including top/ceiling, bottom/floor and all side walls. This does not include interior partition walls within the *dwelling unit*, *sleeping unit*, or ~~occupiable~~ *conditioned enclosed space*. Wall height shall be measured from the finished floor of the *conditioned space* to the finished floor or roof/ceiling air barrier above.

Reason: Air leakage can be a significant source of energy waste in buildings, contributing to higher heating and cooling costs for building owners and occupants, and increasing risk related to comfort and durability. Air tightness testing can result in more attention to envelope assembly air barrier sealing and significantly reduced building leakage. Adequate control over air leakage can provide many benefits, including reduced HVAC equipment sizing, better building pressurization, and energy savings due to reduced heating and cooling of infiltrated outside air. In moist climates, ensuring lower air leakage through whole-building testing can also result in better humidity control and reduced risk of durability issues. While it is important that the materials and assemblies have limited leakage, that alone does not guarantee a low leakage building. Recent research shows that 40% of buildings constructed without an envelope consultant have air leakage exceeding the currently optional test standard requirements, while buildings with envelope consultants all had leakage below 0.25 cfm/ft (Wiss J. 2014).

Testing is the most reliable means of ensuring that the intent of this code section—limiting unintended energy waste in buildings due to air infiltration—will be achieved. Durston and Heron's review (2012) of the 0.25cfm/ft^2 requirement by the U.S. Department of Defense (DOD) shows that without testing, the range of building leakage can exceed the requirement by more than double (0.9 cfm/ft). However, with testing included as part of the construction process, the average leakage of buildings was determined to be below the 0.25 cfm/ft limit and in many cases lower leakage levels in the range of 0.15 cfm/ft^2 can be achieved (Durston and Heron 2012). Therefore, a test limit of 0.25 cfm/ft is considered to be both a realistic and achievable goal.

This amendment proposes exempting whole building leakage testing for buildings larger than 250,000 ft^2 because of the technical and practical issues with testing these large buildings. This amendment also proposes different test thresholds for multifamily structures (Group R and I occupancies) that align with current industry practice in blower door testing for the multifamily market. The original air leakage testing threshold for residential buildings of 0.30 cfm/square foot tested at 50 Pascals was lowered to 0.20 cfm/square foot to align with the requirements in ASHRAE 62.2.

Additioanlly, as a result of these previous changes, the air leakage rate in Section C406.9 was reduced from 0.25 cfm/ft2 to 0.17 cfm/ft2 at 75 Pa and the specific requirements for Group R and Group I buildings were added as an exception.

Bibliography: Wiss J. 2014. *ASHRAE 1478-RP Measuring Airtightness of Mid- and High-Rise Non-Residential Buildings*. Elstner Associates, Inc. for ASHRAE. https://www.ashrae.org/resources--publications/periodicals/enewsletters/esociety/2014-12-10-articles/completed-research-december-2014.

Durston JL and M Heron. 2012. *Summary and Analysis of Large Building Air Leakage Testing for the U.S. Department of Defense*. Atlanta, GA. https://cdn.ymaws.com/www.nibs.org/resource/resmgr/BEST/best3_durston.2.9.pdf.

Cost Impact: The code change proposal will increase the cost of construction.

This measure will increase the cost of construction of new commercial buildings as whole building air leakage testing will be required except for primarily residential buildings (Group R and I building occupancies). Based on a survey of professional commercial building air barrier testing companies, it was determined that the cost of air leakage testing fell into three ranges:

- $350 or $0.12 to $0.07 per square foot for buildings up to 5000 square feet
- $0.50 to $0.15 per square foot for buildings between 5000 and 50,000 square feet
- $0.15 to $0.09 per square foot for buildings between 50,000 and 100,000 square feet, with decreasing costs for larger buildings.

As demand for air leakage testing in commercial buildings increases, more companies will enter the market to provide these services. Therefore, a gradual decrease in cost is expected as more companies are available to do the testing.

Workgroup Recommendation

Commercial Energy Committee Committee Action: As Modified

Commercial Energy Committee Reason: CEPI-58 was modified by the proponents to remove overlapping changes with other proposals that also addressed re-structuring, test exemptions, and test stringency.

CEPI-137-21

IECC®: C405.1.1

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Energy Conservation Code

Revise as follows:

C405.1.1 Lighting for dwelling units. No less than 90 percent of the permanently installed lighting serving dwelling units~~, excluding kitchen appliance lighting,~~ shall be provided by lamps with an efficacy of not less than 65 lm/W or luminaires with an efficacy of not less than 45 lm/W, or shall comply with Sections C405.2.4 and C405.3.

Exceptions:

1. Lighting integral to a kitchen appliance or exhaust hood.
2. Antimicrobial lighting used for the sole purpose of disinfecting.

Reason: The efficacy requirements of Section C405.1.1 were developed to apply to lighting used for illumination. There are multiple exceptions to the requirements that should be recognized for dwelling units, similar to other spaces in other occupancies. Instead of continuing to expand the list of exceptions in C405.1.1 (which should include kitchen appliance lighting equipment and antimicrobial/germicidal lighting at a minimum), it is more reasonable to reference exceptions that are already itemized in Section C405.3.1. This proposal also improves organization of Section C405.3.1 by moving the exceptions to a subsection for clarity and ease of reference.

Cost Impact: The code change proposal will neither increase nor decrease the cost of construction.
This proposal clarifies the intent of this section, resulting in no increase or decrease in the cost of construction.

Workgroup Recommendation

Commercial Energy Committee Committee Action: As Modified

Commercial Energy Committee Reason: This proposal clarifies exceptions to high-efficacy lighting requirements.

CEPI-257-21

IECC®: APPENDIX X (New), SECTION 202 (New), X.1 (New), X.2 (New), X.3 (New), TABLE X.3 (New), X.4 (New), X.4.1 (New), X.4.2 (New), X.4.3 (New)

Proponents: Duane Jonlin, representing City of Seattle (duane.jonlin@seattle.gov)

2021 International Energy Conservation Code

Add new text as follows:

APPENDIX X
THE 2030 GLIDE PATH

Add new definition as follows:

OWNER. Any person, agent, operator, entity, firm or corporation having any legal or equitable interest in the property; or recorded in the official records of the state, county or municipality as holding an interest or title to the property; or otherwise having possession or control of the property, including the guardian of the estate of any such person, and the executor or administrator of the estate of such person if ordered to take possession of real property by a court.

Add new text as follows:

X.1 Prescriptive compliance. Where compliance is demonstrated using the prescriptive compliance option in Section C401.2.1, the number of additional efficiency credits required by Section C406.1 shall be 50 percent higher than that required by Table C406.1.1.

X.2 Total Building Performance compliance. Where compliance is demonstrated using the total building performance option of Section C401.2.1, the percentage of annual energy cost (PAEC), applied to the standard reference design referenced in Equation 4-23, shall be multiplied by 0.98.

X.3 On-site renewable electricity systems. In addition to any renewable energy generation equipment provided to comply with Section C406.3, buildings shall install equipment for on-site renewable energy generation with a direct current (DC) nameplate capacity rating of not less than that computed using Equation X-2.

$AA=CA + SNA/3$ **(Equation X-1)**

where:

AA = Adjusted area, in ft^2 (m^2)

CA = Conditioned area, in ft^2 (m^2)

SNA = Semi-heated and nonconditioned area, in ft^2 (m^2)

$REQ = AA \times CF$ **(Equation X-2)**

where:

REQ = Required on-site capacity, in DC watts

AA = Adjusted area from Equation X-1, in ft^2 (m^2)

CF = Capacity factor from Table X-3, in watts/ft^2 (m^2)

Exceptions:

1. Any required renewable energy generation capacity in excess of 10 W/ft 2 (108 W/m2) of net available roof area is permitted to be provided using an off-site renewable energy system in accordance with Section X.4. For the purposes of this section, net available roof area is the gross roof area minus the roof area occupied by any combination of skylights, mechanical equipment, vegetated areas, required access pathways, vehicle parking, and occupied roof terrace area.

2. The following buildings are permitted to provide off-site renewable energy generation in accordance with Section X.4 in lieu of all or part of the on-site renewable energy generation capacity required by Section X.3.

   2.1 Any *building* where more than 50 percent of roof area would be shaded from direct-beam sunlight by existing natural objects or by structures that are not part of the *building* for more than 2500 annual hours between 8:00 a.m. and 4:00 p.m.

   2.2 Any *building* with gross *conditioned floor area* less than 1,000 square feet (93 m^2).

   2.3 Any *building* whose primary roof slope is greater than 2 in 12.

3. Alternate forms of *renewable energy generation capacity* are permitted where the annual energy generation is not less than that produced by the required solar capacity, and where annual energy generation is calculated using an *approved* methodology.

4. All or part of the required *renewable energy generation capacity* is permitted to be replaced by other efficiency measures provided such measures will reduce the annual energy consumption of the *building* by an amount no less than that which would otherwise be produced annually by the required renewable energy capacity, as calculated using the total building performance compliance path in Section C407 and an *approved* calculation methodology for solar production.

TABLE X.3 ON-SITE RENEWABLE ELECTRICITY

Climate Zone	Capacity Factor
1A, 2B, 3B, 3C, 4B, and 5B	2.0 W/ft^2 (22 W/m^2)
0A, 0B, 1B, 2A, 3A, and 6B	2.3 W/ft^2 (25 W/m^2)
4A, 4C, 5A, 5C, 6A, 7, and 8	2.6 W/ft^2 (29 W/m^2)

X.4 Off-site renewable energy. *Buildings* that qualify for one or more of the exceptions to Section X.3 and that do not have on-site renewable energy systems sufficiently sized to fully comply with Section X.3 shall procure off-site renewable energy in accordance with Sections X.4.1 through X.4.3. Such procured energy shall provide not less than the total annual required off-site renewable energy determined in accordance with Equation X-4 and shall be provided in addition to any renewable energy provided to comply with Section C406.3.

DEF = REQ - INSTL **(Equation X-3)**

where:

DEF = Renewable capacity deficit, in DC watts

REQ = Required on-site capacity in DC watts, from Equation X-2

INSTL = Installed on-site capacity, in DC watts

OFF = 4.4 x DEF **(Equation X-4)**

where:

OFF = Off-site renewable energy to be procured, in kWh/year

X.4.1 Off-site procurement. The building owner shall procure and be credited for the total amount of off-site renewable energy required by Equation X-4. Procured off-site renewable energy shall comply with the requirements applicable to not less than one of the following:

1. *Community renewables energy facility*.
2. *Financial renewable energy power purchase agreement.*
3. Physical renewable energy power purchase agreement.
4. *Direct ownership*
5. *Renewable Energy Investment Fund.*

X.4.2 Off-site contract. The renewable energy shall be delivered or credited to the building site under an energy contract with a duration of not less than 10 years. The contract shall be structured to survive a partial or full transfer of ownership of the building property. The total required off-site renewable energy shall be procured in equal installments over the duration of the off-site contract.

X.4.3 Renewable energy certificate (REC) documentation. The property *owner* or *owner's* authorized agent shall demonstrate that where RECs are associated with on-site and off-site renewable energy production required by Sections X.3 and X.4, the following criteria shall be met:

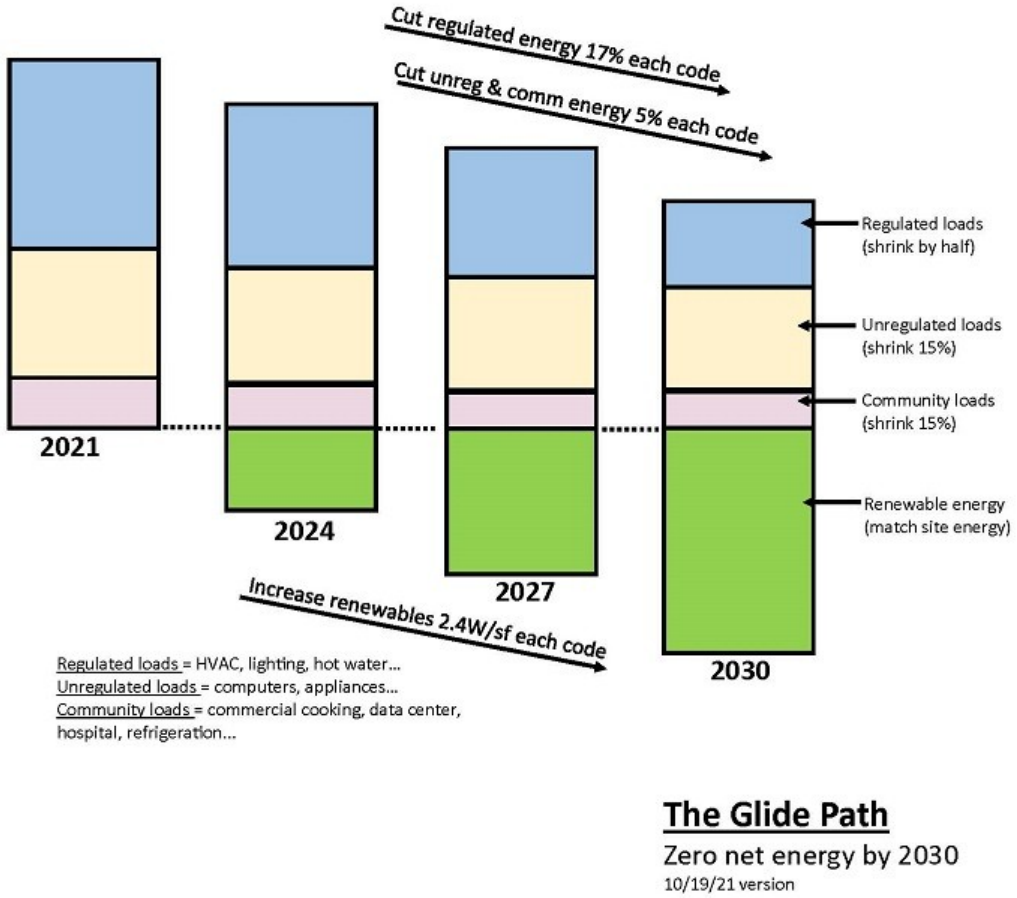
1. The RECs shall be retained and retired by or on behalf of the property *owner* or tenant for a period of not less than 10 years or the duration of the contract in X.4.2, whichever is less;
2. The RECs shall be created within a 12-month period of the use of the REC; and
3. The RECs represent a generating asset constructed no more than 5 years before the issuance of the certificate of occupancy.

Reason: This appendix is intended to be adopted by jurisdictions that will require new construction to operate at net zero energy by the year 2030. It reduces the net annual energy use of buildings by approximately one-third in comparison with buildings constructed in compliance with the 2021 IECC, assuming that the 2027 and 2030 editions will also reduce energy use by one-third each.
It is estimated that *regulated* energy uses in buildings can be cut by 50% from current levels by 2030, but that unregulated loads and large community process loads will only diminish about 15% in the same time period. If regulated loads comprise 60% of building energy use, and unregulated loads (not counting large process loads) comprise the remaining 40%, halving the regulated loads would result in a 30% reduction in energy use, or 10% for each of the three Glide Path steps. Reducing unregulated and process loads by 15% over this decade would result in an additional 9% overall building energy use reduction by 2030, or 3% reduction per code cycle. Some of this 13% reduction (10% regulated and 3% unregulated/process) will occur in the base code development, and the remainder is required by this appendix.

For the 2030 ZNE target, renewable or site-recovered energy will be required to compensate for the remaining half of regulated energy use, plus the typical unregulated building energy use, and an additional amount to cover a proportionate share of community process energy.

Rather than burdening those buildings that contain large process loads (restaurant, grocery, hospital, data center, laboratory, etc.) with a requirement to provide renewable energy to cover their entire operating energy use, this Appendix requires an additional amount of renewable energy for *all* new building square footage in recognition of the fact that those large process loads serve the entire community with essential services. It is estimated that such community process loads equal approximately 20% of all other building energy loads.

If 39% of a building's net energy use reduction can be covered with efficiency and technology improvements, the remaining 61% of the *net* energy use reduction will be accomplished with acquisition of renewable energy resources, also in three roughly equal steps. Assuming typical PV production to be 1.5 kWh/year/watt, this would result in a requirement for 7 W/sf of conditioned floor area for 2030, or roughly 2.4 W/sf for 2024. For semi-heated or unconditioned space, the requirement will be 1/3 of this amount, or 0.8 W/sf for 2024.

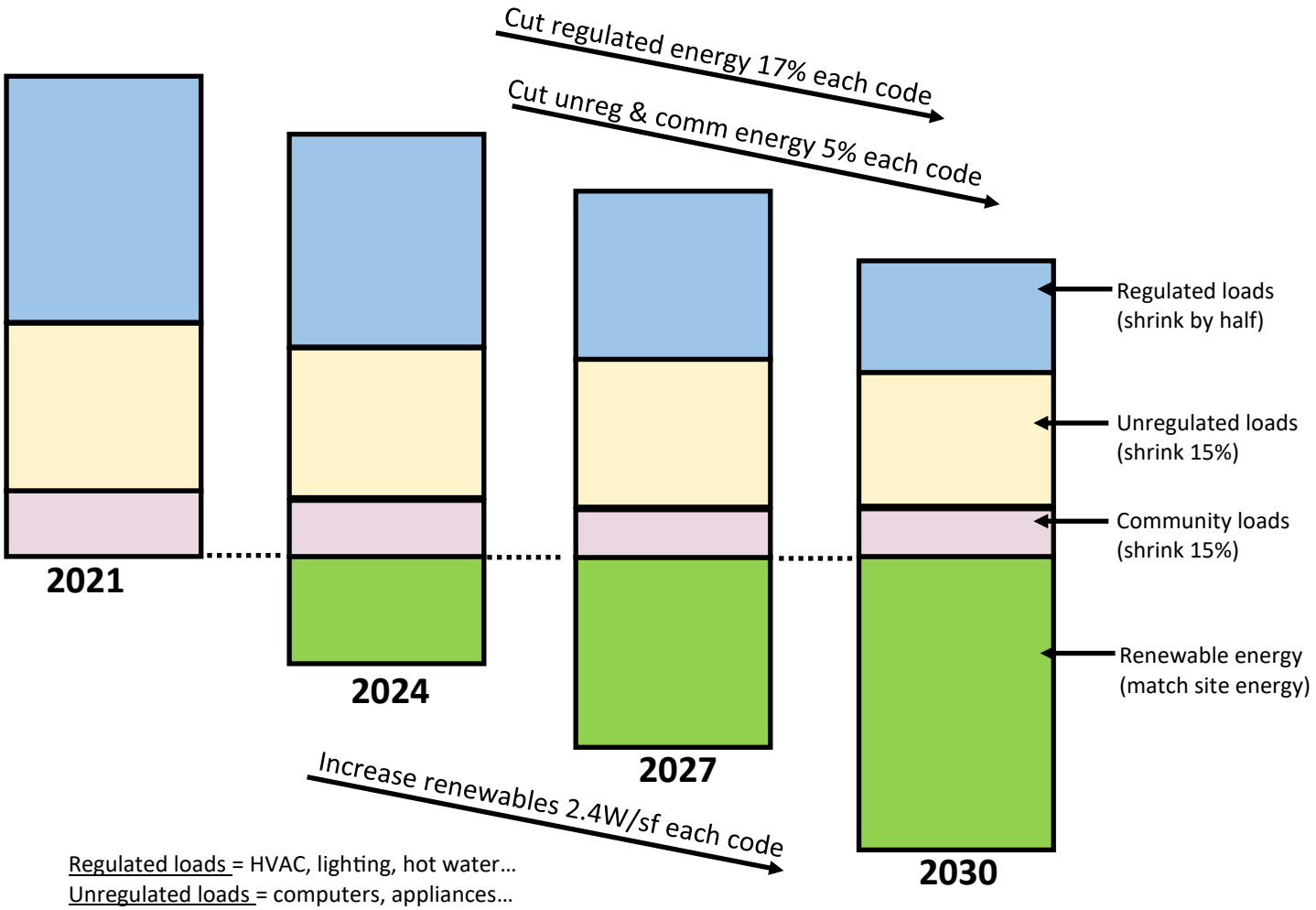


Cost Impact: The code change proposal will increase the cost of construction.
The installed cost of rooftop PV arrays will be something like $2.00 per watt during the active period of this code edition, although additional price decreases may continue to occur. The savings will vary greatly, depending on climate zone and utility rates.

The number of additional efficiency credits required for those pursuing the prescriptive compliance paths will vary depending on how much efficiency progress is made in the base code - the more the base code advances, the lower the cost of compliance.

Attached Files

- **Glide Path diagram.pdf**
  https://energy.cdpaccess.com/proposal/541/1243/files/download/234/



Regulated loads = HVAC, lighting, hot water…
Unregulated loads = computers, appliances…
Community loads = commercial cooking, data center, hospital, refrigeration...

The Glide Path

Zero net energy by 2030

10/19/21 version

Workgroup Recommendation

Commercial Energy Committee Committee Action: As Modified

Commercial Energy Committee Reason: This proposed appendix establishes a pathway to net-zero energy consumption by 2030.