RHODE ISLAND STRETCH CODES

Residential Stretch Code
- Adopted January 2018
- Zero Energy Ready Homes
- PV & EV ready
- Water & materials efficiency

Commercial Stretch Code
- January 2018 – major revision of 2014 Green Construction Code
- Primary model - International Green Construction Code

Code Development Funding:
Rhode Island Office of Energy Resources
National Grid
COMMERCIAL STRETCH CODE

Mandatory for public buildings, otherwise voluntary

Modified 2015 International Green Construction Code (IGCC)

Stronger Energy efficiency provisions
- Assure performance better than base code
- Align with National Grid incentive programs
- Full and clear building commissioning provisions
- ZEPI score required for all compliance paths
- Third party compliance options

COMMERCIAL SC; PRIMARY ENERGY PROVISIONS

- Site orientation and features
- Insulation levels
- Air sealing & testing
- Fenestration performance
- HVAC design, equipment & controls
- Lighting design & controls
- Daylighting
- Plug loads
- Systems commissioning
- Renewable energy
**ADDITIONAL PROVISIONS**

- Transportation access
- Indoor air quality
- Local materials
- Water conservation
- Construction management

**VOLUNTARY RESIDENTIAL STRETCH CODE**

*Energy Efficiency Compliance Paths*

Homes designed & constructed to be zero net energy upon installation of solar PV system

All paths offer prescriptive and/or performance compliance
RESIDENTIAL SC ENHANCEMENTS

Stronger EE provisions ≥ NGRID efficiency program levels

Renewable Energy Ready
• Site evaluation
• Roof or ground mount ready
• Conduit and circuit breaker space in electrical panel

Electric Vehicle Charging
• Level 2 (240v) charging port
• Or; conduit and circuit breaker installation for future charging port

ADDITIONAL PROVISIONS

Site development
EPA Water Sense Program or equivalent

Indoor Environmental Quality
• Limit VOC content of finishes
• Meet ventilation requirements
• Operations & Maintenance
• Comprehensive systems and appliance manuals
RESIDENTIAL STRETCH CODE

Compliance Paths

- Referenced program verification procedure/documentation
- Third-part verification through certified professionals

DAVID – DC SLIDES (10 MINUTES)
Aggressive Code/Performance Goals Widely Adopted

• 2030 Challenge (Architecture 2030, ASHRAE, USGBC)
• 2030 Commitment (AIA)
• CA Big Bold Goals
• Carbon Neutral Cities Alliance/Urban Sustainable Directors Network
• Federal, State, and City Jurisdictions
• 372 Cities in North America have GHG reduction goals

• Paris Accord
Washington Statutory Code Path

New York – Stretch and Code Minimums
Zero Energy Performance Index (zEPI) for Energy Codes

Trajectory for Existing Buildings 80x50
Trajectory for New Buildings ZNE by 2030

Model Stretch Code 20%

Yr.  2000  2010  2020  2030

Zero Cities Project

Zero Cities Project

- Seattle
- Boston
- Washington, DC
- San Francisco
- New York
- Portland
- Phoenix
- Palo Alto
- Cambridge
- Boulder
Model Stretch Code Strategies

- 20% Improvement on 90.1-2013 (Stretch Code)
- 40% Improvement on 90.1-2013 (Design Standard)
- ZNE Code (Performance Standard)

Commercial Measures – 20% Stretch

- Window-Wall-Ratio
- Plug-Load-Control
- Exterior-Lighting-Power
- Efficient-Plumbing-Fixtures
- Computer-Power-Management
- Interior-Lighting-Power-Density
- Dedicated-Outside-Air-System
- Service-Water-Heat-Recovery
- Daylight-Responsive-Controls
- Opaque-Assemblies
- Efficient-HVAC-Equipment
- Exterior-Lighting-Control
- Fan-Power-Limits
- Fenestration-Performance
- HVAC-Vacancy-Control
- Minimized-Thermal-Bridges
- Interior-Lighting-Controls
- Mechanical-System-Selection
- Reduced-Solar-Gains
- Air-Barrier-Performance
- Energy-Recovery-Ventilation
- Efficient-Kitchen-Equipment
NYStretch 2018

Technical basis for meeting 20% reduction goal (beyond ASHRAE 90.1-2013)

NYStretch 2018

Results Summary
NYStretch Base Measures

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Prototype</th>
<th>Construction Weight [%]</th>
<th>Site Energy [kBtu/ft²]</th>
<th>% Energy Savings</th>
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<tbody>
<tr>
<td>Office</td>
<td>Large office</td>
<td>10.1%</td>
<td>60.11</td>
<td>37.25</td>
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<tr>
<td>Retail</td>
<td>Stand-alone retail</td>
<td>15.5%</td>
<td>69.23</td>
<td>11.60</td>
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<td>Education</td>
<td>Secondary school</td>
<td>11.4%</td>
<td>36.87</td>
<td>32.73</td>
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<tr>
<td>Lodging</td>
<td>Large hotel</td>
<td>9.1%</td>
<td>87.68</td>
<td>69.04</td>
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<tr>
<td>Apartment</td>
<td>25-story apartment</td>
<td>25.3%</td>
<td>62.84</td>
<td>26.07</td>
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<tr>
<td></td>
<td>50-story apartment</td>
<td>22.0%</td>
<td>61.3%</td>
<td>35.04</td>
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<tr>
<td>Weighted Average (across all climate zones in NY)</td>
<td>100.0</td>
<td>54.1%</td>
<td>47.81</td>
<td>25.3%</td>
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40% Design Standard

Prescriptively achievable?

![Graph showing PHIUS heating and cooling demand by CZ](image)

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40% Design Standard

- ASHRAE 90.3 2013 Backstop
- 40% Stretch Code - Prescriptive Path
- 40% Stretch Code - Additional Efficiency Packages

- Energy and water conservation
- Commissioning
- Enhanced energy performance
- Enhanced thermal performance
- Enhanced comfort and user satisfaction
- Enhanced operational flexibility
- Enhanced life cycle cost savings

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The Path to Zero Energy Codes

- Continue to develop OPTION PATHWAYS that encourage the use of more efficient equipment
- Track potential changes in PRE-EMPTION POLICIES especially here in California
- Consider project mix and relative energy use intensity of different BUILDING TYPES in energy code development process
- Develop and implement new code proposals for measures that directly impact PLUG and EQUIPMENT LOADS
- Recognize that some specific end uses make up a disproportionate percentage of total building sector energy use. Prioritize key code strategies to TARGET SPECIFIC END USES
The Path to Zero Energy Codes

- Consider energy codes in a larger policy context that begins to address BUILDING OPERATION and MAINTENANCE and OCCUPANT BEHAVIOR as an integral part of building performance policy.
- Research and develop code proposals that integrate measures between and among MULTIPLE BUILDING SYSTEMS.
- Track and review other jurisdictions with OUTCOME-BASED CODE pathways so as to develop and offer a similar compliance option in future code cycles.
- Prepare a complimentary package of code measures as a STRETCH CODE that can be supported by utility incentives.
- Recognize that code development cycles must be used to BUILD a FOUNDATION for subsequent efforts that cannot be undertaken in a single code change cycle.

Getting to Zero
DC’s Appendix Z

Dave Epley | Green Building Division Manager
Department of Consumer and Regulatory Affairs, District of Columbia Government
DCRA Green Building Division

• Enforces the DC Energy Conservation Code, DC Green Building Act, DC Green Construction Code & other Green-Related Regulations
• Regulate green tech (e.g. solar) & shepherd new green tech (CLT, battery storage, etc.)
• Educate, train and build awareness in the Building Industry and community
• Develop new green policies/ conduct research
• Technical resource for all things green building

BuildGreenDC.org
Background

- The District is currently under the 2012 I-Codes as modified by the 2013 DC Code Supplements
- That includes the 2012 IgCC which includes an energy chapter & is applicable to most buildings over 10,000 SF
- The District is committed to the Paris Climate Accord and is aiming for net zero mandatory new construction for all building types, phased in over the next decade or less
- To reach the goal, we needed to see a transformation in the mind-set of the building industry as well as local capacity to deliver the services needed to design and build successful zero energy buildings
Appendix Z

- In the current code adoption cycle, DC created a net-zero energy code called “Appendix Z”
  - It is currently under review and will be out of public comment soon
- Appendix Z is a design and outcome-based net zero code administered by the Building Department
  - It is the end-game
  - It’s a bright flag at the top of the mountain that will inspire and motivate the building industry
  - As well as accustom them to the concepts/technology and begin to transform the industry
  - It flips the Energy Code conversation on its head
  - No more percentage better than <insert standard>

Appendix Z

- Specifically applicable to buildings under the DC Commercial Energy Code
- Initially being phased in as an incentivized, voluntary standard that will serve as an alternative compliance path to the DC Energy Conservation Code
- Intended to be incentivized in two parts
  - Design and Permit Review: Structural incentives (ex. Expedited permitting) and technical assistance
  - Post-occupancy: Performance/outcome pay for performance incentive
- Administered by the DC Green Building Division
Appendix Z

- Applicable to new construction and level 3 alterations
- At design predictive modeling shall show a source energy unit of measurement (zEPI) of 40 or better
  - COMNet Rules and Procedures Manual required
- Mandatory minimum heating / cooling demand
  - Annual heating demand: 4.2 kBtu/ft²
  - Annual cooling demand: 6.4 kBtu/ft²
- Renewable can be on-site (PV, Solar thermal, wind, biogas) or off-site (strict guidance)
  - 5% of total building energy consumption be met by solar on the roof (if adequate solar access)

Appendix Z

- Cx required: Building envelope, airtightness testing, HVAC (mechanical and passive systems), lighting, domestic hot water, renewable energy systems
- All energy delivered or produced to building must be metered
- Benchmarking
  - Annual benchmarking under Portfolio Manager with full access to DC
- Performance verification within 36 months
  - Demonstrate 12 months with 90% occupancy where net zero is achieved
Enforcement

- Design
- Permit
- Inspection
- C of O
- Post C of O

Challenges

- Preliminary design review and charette(s)
- Enforcement
  - Plans and supplemental document review
  - On-site inspections
  - Verification of metering and benchmarking at CO
  - 36 month period to show performance
  - Enforcement is intended to encourage and provide technical assistance to move projects along. Not intended to be scary, punitive process
- Building local capacity (approved providers)
  - Building a network of approved providers
  - Trainings and education
  - Case studies
Thank you for your time!

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MODERATED DISCUSSION

• Is ZNE the right vehicle for stretch codes?
• Is “stretch code” the right term?
• Enforcement/compliance issues
• Ways to engage (all) markets
• Voluntary/mandatory/Mandating renewable energy
ADDITIONAL TOPICS

- Financial models/incentives
- Adopting existing program models
- Electrification
- M&V – metering for compliance/education/continuous improvement
- Cost issues