The International Green Construction Code (IgCC) and Water Efficiency Provisions

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International Code Council (ICC) Background

Nonprofit corporation Headquartered in Washington D. C.
- Regional Offices in U.S. (California, Alabama, & Illinois)

A 58,000 member association with 360 Chapters dedicated to building safety
- Members include code officials, designers, contractors, manufacturers, academia, etc.

Develops the model codes used to construct residential and commercial buildings
- Currently maintain 15 base codes and 8 Standards

Parent of ICC-ES, IAS, & SRCC subsidiaries
Staff of nearly 300 engineers, architects, and administrators
A family of 15 coordinated and correlated codes
- International Building Code®
- International Fire Code®
- International Mechanical Code®
- International Plumbing Code®
- International Residential Code®
- International Fuel Gas Code®
- International Property Maintenance Code®
- International Private Sewage Disposal Code®
- International Zoning Code®
- International Wildland Urban Interface Code®
- ICC Performance Code for Buildings and Facilities®
- International Swimming Pool & Spa Code
- International Green Construction Code®
- International Energy Conservation Code®
- International Existing Building Code®

What is the IgCC?
- An Adaptable, Useable and Enforceable code.
- Intended to reduce the negative impacts of the built environment on the natural environment
- Addresses:
  - Site Development and Land Use
  - Material Resource Conservation and Efficiency
  - Energy Conservation, Efficiency & CO2e Emission Reduction
  - Water Conservation and Efficiency
  - Indoor Environmental Quality and Comfort
Intent and Scope

- Consistent and coordinated with the ICC family of Codes & Standards
- Intended to be enforced primarily by building officials/local governments
- Intended to drive green building into everyday practice
- Applicable to the construction of
  - All buildings, both existing and new, except:
    - Single family residences, Duplexes, and Townhouses
    - R-2 (Apartments, etc.) and R-4 (Assisted living facilities) Occupancies 4 stories or less in height.
  - Exceptions above are regulated by ICC 700 where the jurisdiction indicates so in Table 302.1.

Developed By:

- IgCC developed by ICC in association with:
  - ASTM and
  - American Institute of Architects (AIA)
- References ASHRAE Standard 189.1 as an alternative compliance path, as developed by:
  - ASHRAE and partners
  - USGBC and
  - Illuminating Engineers (IES)
- ASHRAE 189.1 and IgCC will merge in 2018
IgCC Context

- The IgCC is not a rating system, nor is it intended to replace them.
- The IgCC is a code which is intended to be adopted on a mandatory basis.
- The IgCC consists of minimum mandatory requirements, similar to the other I-Codes.
- The IgCC contains a new regulatory framework that facilitates both jurisdictional customization and flexibility for owners and designers.

Min. requirements
- Enforceable law
- Consensus developed
- Interpreted by code officials

Sets stakeholder-based standards of practice
- Referenced in codes
- Enforced extension of code or accepted design practice

Elective criteria
Achievement through ratings
Third-party or self-certified
Beyond minimum
Still subject to code review
Chapter 3: Jurisdictional Requirements

Jurisdictional Requirements
- Allows jurisdictions to customize the code to address additional environmental criteria
- These criteria may not be desired for some jurisdictions.
- May be beneficial in others.

Jurisdictional Requirements
Table 302.1

Choices affecting Chapters 4 through 10

- IgCC Table 302.1 allows regional choices, similar in concept to Table R302.1(1) in the IRC.
- Allows jurisdictions to make choices for higher levels of stringency by:
  - Determining whether certain provisions will be enforced in the jurisdiction.
  - Decisions made in the Table apply to all buildings constructed in the jurisdiction.
Chapter 4: Site Development and Land Use

- Preservation of natural resources (Tied to T302.1)
- Natural resources inventory required
- Stormwater management
- Site Lighting (Tied to T302.1)
- Landscape irrigation
- Management of vegetation, soils and erosion control
- Building site waste management
- Transportation impact
- Heat island mitigation

Chapter 4 – Transportation Impact

- A walkway/bicycle paths is required to connect streets or other paths to the building main entrance.
- Changing and shower facilities are required where:
  - Building > 10,000 square foot
  - And is required to be provided with long term bicycle parking and storage.
Transportation Impact (Cont.)

- Parking for high occupancy, low emission, hybrid and electric vehicles required only where all of the following conditions are met:
  - Indicated by the jurisdiction in Table 302.1
  - Building aggregate area > 10,000 square foot
  - Building occupant load > 100

Chapter 5: Material Resource Conservation and Efficiency

- Construction material and waste management plan
  - 50% construction waste diversion min.
  - Jurisdictions can select higher values in Table 302.1

- Requires recycling areas for use by building occupants

- Whole Building Life Cycle Assessment Not a mandatory requirement.
Chapter 5: Material Resource Conservation and Efficiency

- 55% of materials must be:
  - Recycled,
  - Recyclable,
  - Bio-based, or
  - Indigenous.

(Materials are permitted to have multiple attributes.)

- EPD's Compliance Option

- Mercury limits for fluorescent lamps

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Chapter 5: Material Resource Conservation and Efficiency

- Addresses moisture control in the building envelope. It requires specific inspections of the following, as also referenced in Table 903.1
  - Foundation sub-soil drainage systems
  - Foundation water-proofing and damproofing
  - Under slab water vapor protection
  - Flashing
  - Exterior wall coverings
  - Roof coverings
Chapter 6: Energy Conservation, Efficiency & CO₂e Emission Reduction

- Chapter 6 is applicable to new buildings and additions to existing buildings.
- Contains detailed energy requirements.
- Energy requirements for alterations to existing buildings are found in Ch 10.
- The IgCC provides the following energy compliance paths:
  - Prescriptive-based
  - Performance-based zEPI (Zero Energy Performance Index)
  - Outcome-based

Performance-Based zEPI & the IECC

<table>
<thead>
<tr>
<th>Year, Code Edition or Other</th>
<th>Year 2000 mean of all existing building stock</th>
<th>2006 IECC</th>
<th>2009 IECC</th>
<th>2012 IECC</th>
<th>IgCC Point of Entry (see Section 602.1.1)</th>
<th>Jurisdiction (see Table 302.1)</th>
<th>Net-Zero Energy Building</th>
</tr>
</thead>
<tbody>
<tr>
<td>zEPI Scalar</td>
<td>100</td>
<td>73</td>
<td>62</td>
<td>51</td>
<td>51</td>
<td>46%?</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(27% +/- better than year 2000 zEPI scalar of 100)</td>
<td>(15% +/- better than 2006 IECC zEPI scalar of 73)</td>
<td>(30% +/- better than 2006 IECC zEPI scalar 73)</td>
<td>(30% +/- better than 2006 IECC zEPI scalar 73)</td>
<td>(10% +/- better than the zEPI point of entry scalar of 51)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 6 Contents

General
- Minimum zEPI score of 50
- Energy metering, monitoring and reporting
- Automated demand-response infrastructure
- Building envelope systems
- Building renewable energy systems
- Building mechanical systems

Chapter 6 - Building Renewable Energy Systems

Requires that buildings provide:
- At least 2% of total calculated annual energy use by means of one of the following types of renewable energy systems:
  - Solar photovoltaic
  - Wind
- Or -
- At least 10 percent of building hot water must be supplied by a solar hot water heating system.

Exceptions:
- For sites with multiple buildings, buildings can comply collectively.
- Where 4 percent of building energy consumption is:
  - From renewable generation by means of 10-year renewable energy credit ownership.
  - By means of a combination of on-site renewable energy generation and renewable energy credit ownership.
Chapter 6 - Energy Systems Commissioning and Completion

- Mechanical systems commissioning and completion requirements:
  - A commissioning plan must be developed and included in the construction documents
  - System adjusting and balancing
  - Functional performance testing
  - Preliminary commissioning report
  - Completion requirements

Chapter 7: Water Conservation and Efficiency

- Seeks water efficiency regardless of the source
- Efficiency provisions for:
  - Plumbing fixtures/fittings
  - Appliances
  - Carwashes
  - Cooling towers
- Encourages the use of non-potable water wherever possible and permissible.

- HVAC systems and equipment
- Water treatment systems
- Metering
- Alternative water sources
**Chapter 8: Indoor Environmental Quality and Comfort**

- Indoor Air Quality
  - Management Plan Required
- HVAC & Air-handling systems
  - Air-handling system access
  - Durability and cleanability
  - Filters
  - Ventilation requirements
- IAQ construction phase requirements
- IAQ & pollutant control measures
- Material emissions limits
- Acoustics (Tied to T302.1)
- Daylighting

**Chapter 9: Commissioning, Operations & Maintenance**

- Pre-occupancy inspection and testing
- Operation and maintenance manual
- Building maintenance schedules
- Addresses many issues beyond energy
- Commissioning (T-902.1)
- List of items for which commissioning is required or encouraged
- Distinguishes between pre-occupancy and post-occupancy commissioning
Elements of Commissioning

- Owner's Project Requirements (OPR)
- Basis Of Design (BOD)
- Cx Plan
- Design Phase Design Review
- Construction Docs
- Functional Performance Testing (FPT)
- Doc. & Training
- Cx Report

Chapter 10: Existing Buildings

- Alterations/renovations:
  - Loosely based on IEBC
  - Whatever is changed must meet current IgCC requirements.
  - Unaltered components can remain as they are
  - Requirements primarily related to energy & water
  - Capped at 10% of the total cost of alterations & other exceptions.

- Additions are treated much like new construction.
- Historic buildings exempted from many provisions
- Jurisdictions can choose to offer the evaluation of existing buildings for IgCC compliance.
- Chapter 11 covers similar info for building sites.
Appendix A: Project Electives

- Encourages and recognizes construction that exceeds minimum code requirements.
- Encourages green practices that are difficult or impossible to mandate. (e.g., infill and brownfield site development).
- Encourages the implementation of practices that are not triggered by the code or mandated by the jurisdiction in Table 302.1.
- Enforceable only where specifically adopted.
- The jurisdiction sets the minimum number of electives that must be complied with on all projects constructed in the jurisdiction.
- The owner or the owners representative select the specific project electives to be implemented on each project.

Model Code Structure

- Example of a Typical Code structure
- Overview of Green codes
- Model Code
- Adopted Code w/amendments
- Local Code w/amendments
  - International Codes
  - California Codes (Title 24)
  - LA City Codes
Sample of IgCC Adoptions:

- Baltimore, MD
- Washington, DC
- Richland, WA
- Keene, NH
- Dallas, TX
- Maplewood, MN
- Washoe County, NV
- Boulder County, CO
- Carbondale, CO
- Snowmass, CO
- Kayenta Township, AZ
- Boynton Beach, FL
- Phoenix, AZ
- Scottsdale, AZ
- Maricopa Co, AZ
- Surprise, AZ
- Washoe Co, NV
- Federal Heights, CO
- Florida
- Maryland
- North Carolina
- Oregon
- Rhode Island
- Telleryde, CO
- Note: adoptions vary

IgCC Support Services

- Education & Training
  - Classroom and Web-Based
- Certifications
- Publications
- ICC-ES
  - Evaluation Services
- International Accreditation Service (IAS)
Take Aways

INTERNATIONAL GREEN CONSTRUCTION CODE

- Comprehensive & integrated
- Sets minimum requirements
- Creates a Baseline
- Jurisdiction adoptions
- Complete support system

For more information see:
www.iccsafe.org/igcc
WATER EFFICIENCY PROVISIONS

WATER EFFICIENCY PROVISIONS

LOW FLOW TOILETS
WATER EFFICIENCY PROVISIONS

LOW FLOW TOILETS

LOW FLOW FAUCETS

LOW FLOW SHOWER HEADS
Table 702.1 provides maximum flow rates

- Metering
- Additional requirements for appliances and equipment
- Hot and tempered water distribution
- Maximum pipe length
- Maximum pipe by volume
- HVAC systems
- Onsite water treatment devices and equipment
### Plumbing Fixtures Table 702.1

<table>
<thead>
<tr>
<th>Fixture or Fitting Type</th>
<th>Maximum Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Showerhead</td>
<td>2.0 gpm &amp; WaterSense®</td>
</tr>
<tr>
<td>Lavatory Faucet – Private</td>
<td>1.5 gpm @ 60 psi</td>
</tr>
<tr>
<td>Lavatory Faucet – Metered Public</td>
<td>0.25 gpc</td>
</tr>
<tr>
<td>Lavatory Faucet – Nonmetered Public</td>
<td>0.5 gpm</td>
</tr>
<tr>
<td>Kitchen and Bar Sink Faucets</td>
<td>2.2 gpm</td>
</tr>
<tr>
<td>Urinal</td>
<td>0.5 gpf &amp; WaterSense®; or non-water</td>
</tr>
<tr>
<td>Water Closet - Public</td>
<td>1.6 gpf (1.28 gpf, if non-remote)</td>
</tr>
<tr>
<td>Water Closet - Private</td>
<td>1.28 gpf, WaterSense</td>
</tr>
<tr>
<td>Prerinse Spray Valves</td>
<td>1.3 gpm</td>
</tr>
<tr>
<td>Manual Drinking Fountain</td>
<td>0.7 gpm</td>
</tr>
<tr>
<td>Metered Drinking Fountain</td>
<td>0.25 gpc</td>
</tr>
</tbody>
</table>

### Chapter 7 - Fixtures, Fittings, Equipment and Appliances

- Water powered pumps
- Food service handwashing faucets
- Dipper wells
- Automated and self-service vehicle wash facilities
- Commercial food waste disposers
- Combination oven water consumption
- Liquid ring vacuum pumps
- Film processors
Maximum length of pipe

- Why do we care how long the water must travel from the heating source to the fixture?
  - How much time does it take for the hot water to get there?
  - How much water is wasted waiting for the hot water to reach the fixture?
  - How much energy was wasted on getting the hot water to the fixture?

HVAC & Water Treatment

- HVAC equipment water use
  - Hydronic heating & cooling
  - Condensate cooling
  - Cooling towers

- Water treatment devices (softeners, RO)
  - Demand initiated regeneration
  - Salt efficiency
  - Automatic shutoff

- Conductivity Controllers
- Overflow Alarms
- Drift reduction
Outdoor Water

- Carwash systems
  - >50% rinse water collection and reuse (auto)
  - < 40 gallons/vehicle (auto), < 35 (manual)
  - Spray wand < 3 gpm

Where else do we go?

- Chapter 7 is not the only chapter within the IgCC that contains water provisions
Landscape irrigation (404.1.2 IgCC/402.1.2 WEP)
- Requires landscape irrigation systems be designed to reduce potable water use by 50%.
- The controller must regulate irrigation based on weather, climatological or soil moisture status data.
- Irrigation zones shall be based on plant water needs.
- Irrigation systems not direct water onto buildings, foundations, or paved surfaces.

Outdoor fountains & water features

- Where available, municipally reclaimed water or collected rainwater must be used for outdoor fountains and water features.
- Warning signage for the nonpotable water.
- Recirculate the water.
Outdoor Water Chapter 10

- **Pools and spas**
  - Backwash collection and reuse permitted
  - Cover for heated pools and spas over 80°F
  - Timeclock controls on recirculation systems

**WHERE DID THE NONPOTABLE GO?**

- The nonpotable water provisions of Chapter 7 from the 2012 IgCC moved to the 2015 IPC
- Chapter 13 Nonpotable Water Systems
  - On-site nonpotable water (greywater)
  - Nonpotable Rainwater Collection
  - Reclaimed water system
What is the WEP?

- An Adoptable, Useable and Enforceable publication.
- The WEP consists of model code provisions from the IgCC and IPC and is available for adoption.
- The WEP consists of minimum measures, similar to the other I-Codes.
- Seeks water efficiency regardless of the source.
- Encourages the use of non-potable water wherever possible and permissible.
- Addresses:
  - Water Conservation and Efficiency.
WEP Context

- Like the IgCC, the WEP is not a rating system, nor is it intended to replace them.
- The WEP contains a regulatory framework, like the IgCC, that facilitates both jurisdictional customization and flexibility for owners and designers.
- Contains Water Efficiency Provisions.

WEP provisions don’t forget where they came from.

WEP features its own numbering system.

At the same time, it also features the original code book and section the provision was taken from.

So you never have to wonder how you got here.

602.2 (IgCC 702.2) Combination tub and shower valves. Tub spout leakage from combination tub and shower valves that occurs when the outlet flow is diverted to the shower shall not exceed 0.1 gpm, measured in accordance with the requirements of ASME A112.18.1/CSA B125.1.
Water Conservation and Efficiency - WEP 2015

- Seeks water efficiency regardless of the source
- Efficiency provisions for plumbing fixtures/fittings
  - Appliances
  - Carwashes
  - Cooling towers
- HVAC systems and equipment
- Water treatment systems
- Metering

Water Conservation and Efficiency WEP 2015

Non-Potable Moved from IgCC to International Plumbing Code (IPC)
- Included in 2015WEP

- Rainwater collection systems
- Gray water reuse systems
- Reclaimed water systems
- Other alternative water sources
Questions & Answers

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