ASHRAE Standard 100 – 2015
Energy Efficiency in Existing Buildings
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1. The need for ASHRAE Std. 100
2. What is Std. 100
3. Compliance
4. Next Steps – Include Canada in the tables
ASHRAE Std. 100 – The Need

• Existing Buildings
  – In the US – Approx. 5.6 Million commercial buildings (CBECS 2012)
  – In Canada – Approx. 0.5 Million commercial/institutional buildings (SCIEU 2009)

• Building Energy Use
  – In 2014 - BC Hydro total domestic electricity sold was 53,018 Gigawatt-hours
  – Residential, light industrial and commercial accounted for 69% of total electricity sold
ASHRAE Std. 100 – The Need

75% to 80% of All Buildings
That will exist in 2030
Exist Today

Our Greatest Opportunity to Reduce
Energy consumption & provide for a
Sustainable Future is in:

Existing Buildings
ASHRAE Std. 100 – The Need

• International Energy Conservation Code (IECC)
• ASHRAE Std. 90.1
• ASHRAE Std. 90.2

Are energy codes and standards for the design and construction of new buildings
ASHRAE Std. 100 – What is it?

ASHRAE Standard 100 – 2015

Energy Efficiency in Existing Buildings

Provides the **minimum** requirements for energy efficient design and operation of **existing** residential, commercial, institutional and industrial buildings.
ASHRAE Std. 100 – What is it?

• Provides Guidance to building owners and operators on processes and procedures needed to the energy consumption of their buildings
• Provides a code ready standard that can be used by state and local jurisdictions to write directly into building codes
• Provides a verifiable process that federal & state authorities and utility companies can use to support tax incentive, rebate and other programs
ASHRAE Std. 100 – What is it?

Basic Index

1. Purpose
2. Scope
3. Definitions
4. Compliance Requirements
5. Energy Management Plan
6. Operation and Maintenance Plan
7. Energy Use Analysis & Target Requirements
8. Energy Audits
9. Implementation & Verification
10. Residential Buildings & Dwelling Units
ASHRAE Std. 100 – What is it?

References

2. Informative Annex B: Timeline
3. Normative Annex C: Forms
4. Informative Annex D: Operation and Maintenance Requirements for Building Systems and Elements
5. Informative Annex E: Energy Efficiency Measures
6. Informative Annex F: Standard 100 Compliance Flow Chart
7. Informative Annex G: Climate Zones
8. Informative Annex H: Simple Payback and Life-Cycle Cost Analysis
10. Informative Annex J: Derivation of Building Energy-Use Intensity Targets
12. Normative Annex L: Operation and Maintenance Implementation
Section 4
Compliance Requirements
Section 4 – Compliance Requirements

1. Compliance Process
   • Building Types
   • Timeline
   • Forms

2. Energy Management Plan

3. Operation and Maintenance Program

4. Building Energy Use
   • Buildings with Energy Targets
   • Buildings without Energy Targets
Energy-Use Intensity (EUI) Targets

• 53 Building Types
• 16 Climate Zones
• Annex J
Section 5

Energy Management Plan
Section 5 – Energy Management Plan

• Annual building net energy use shall be monitored and recorded as an EUI, Energy Use Intensity
• Equipment replacement minimum standards are equal to
  – ASHRAE Std. 90.1, Energy Standard for Buildings, Except Low-Rise Residential Buildings, and
  – ASHRAE Std. 90.2, Energy Standard for Residential Buildings
Section 6

Operation and Maintenance
Section 6 – Operation and Maintenance

• For compliance – Establishing an O & M Program is mandatory
• **Annex L** defines the minimum O&M requirements
• Requirements are targeted to be
  – Feasible for buildings of all sizes and occupancies
  – Practical for the average owner
  – Achieve energy efficiency
ASHRAE Std. 100 – Compliance

Section 7
Energy Use Analysis and Targets
ASHRAE Std. 100 – Compliance

Sect 7 – Energy Use Analysis and Targets

• Authority Having Jurisdiction can pick level of compliance in reference to Benchmark for Target and can be set on both a Site or Source basis

• Owner to conduct energy use analysis from utility bills to get Baseline EUI, Energy Use Intensity, (kBTU/ft²-yr) or (MJ/m²-yr)
ASHRAE Std. 100 – Compliance

Sect 7 – Energy Use Analysis and Targets

• If building type is listed in Target List, compare Baseline to Target
  – If Baseline ≤ Target, requirement of Sec. 7 met
  – If Baseline > Target, must complete Sec 8 & 9

• If building type not listed in Target list, must complete Sec 8 & 9
ASHRAE Std. 100 – Compliance

Section 8

Energy Audit Requirements
Section 8 – Energy Audit Requirements

• Energy Audit requirements for buildings w/o Targets
• Energy Audit requirements for buildings Don’t Meet Targets
• Energy Audit Levels
  – Level 1 Audit
  – Level 2 Audit
Section 9
Implementation and Verification Requirements
Section 9 – Implementation & Verification

• Developing/Implementing an Energy Efficiency Plan
  – Goals
  – Capital Improvement Plan
    • Energy Efficiency Priorities
      – As required to meet EUI of buildings with targets
      – Optimized Bundle of EEMs with simple payback less than or equal to 5 years for buildings w/o targets
  – Implement EEMs
  – Training of Building staff
  – Multiple Buildings
ASHRAE Std. 100 – Compliance

Standard 100 Revision Flow Chart

1. Standard 100 Seek Compliance
2. Small Residential?
   - YES: Complete Requirements in Section 10
   - NO: Implement O&M 4.2.1
3. Implement Energy Management Plan 4.2.2
4. Calculate Measured EUI 4.3.1
5. Is there a Target for Building type?
   - YES: Meet Energy Target?
   - NO: Prioritize, Implement & Commission EEMs
6. Verify Energy Savings
7. Meet Energy Target?
   - YES: Set Savings Goal
   - NO: Conduct Energy Audit
8. Verify Energy Savings
9. Meet Energy Savings Goal?
   - YES: Try Again?
   - NO: Prioritize, Implement & Commission EEMs
10. Conduct Energy Audit
11. Complete Compliance Forms
12. Standard 100 Compliance
13. Standard 100 Non-Compliance

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Develop Target Values for Canada

- **Natural Resources Canada (NRCan)**
  - In communication with the Chair of SSPC 100 WG4 (International Target Table)
  - Has expressed interest in contributing information
  - Has data from the 2009 Survey on Commercial and Institutional Energy Use (SCIEU 2009)
    - Analogous to 2003 CBECs

- **Oak Ridge National Laboratory**
  - Chair of SSPC 100 WG4 in communication with person who created US targets regarding possibility of using the SCIEU 2009 data to create targets for Canada
    - Energy use per m² does not vary much by climate zone
    - Building type in SCIEU parallel categories in CBECs
Thank You!

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