Outline

• National Codes
• History of Energy Code Development
• National Energy Code
• Part 10, Nova Scotia Building Code
• Section 9.36., Nova Scotia Building Code
• NECB 2011/2015
• NECB 2020 and beyond
Terminology

- NECB: National Energy Code for Buildings
- NSBAC: Nova Scotia Building Advisory Committee
- NSBCR: Nova Scotia Building Code Regulation
- NBC: National Building Code of Canada
- SCEEB: Standing Committee on Energy Efficiency in Buildings
- CCBFC: Canadian Commission on Building and Fire Codes
- PTPACC: Provincial/Territorial Policy Advisory Committee on Codes
National Codes

1. 2015 National Building Code of Canada
2. 2015 National Fire Code
3. 2015 National Energy Code of Canada for Buildings
4. 2015 National Plumbing Code of Canada
National Codes

• All National Codes must be adopted by provincial/territorial authorities to become law

• Nova Scotia adopted Section 9.36. of the NBC in December 2013 for houses

• Adoption of the NECB 2011 also occurred at the same time for small buildings
National Codes

• Nova Scotia adopted the NECB 2011 for large buildings in December 2013 with enforcement beginning one year later.

• Adoption of the NECB 2015 occurred in March 2017 with enforcement beginning April 1, 2017. The 2015 National Building Code was adopted on the same date.
National Code System

- PTPACC
- CCBFC
- TG

- SC
- SC
- SC
- SC

9 Standing Committees
(e.g. SC on Energy Efficiency in Buildings)

Task Groups
(e.g. TG on Building Envelope)
National Code System

- From proposed change to requirement
  - Code change request from proponent
  - Standing Committee – Review
  - Standing Committee – Code Development
  - Public Review
  - Standing Committee – Final Recommendation
  - CCBFC
  - Publication of the Codes
Nova Scotia Code System

- Code change request from proponent or addendum/errata or new Code
- NSBAC for review and regulation drafting
- Approval by NSBAC
- Approval by Minister
- 45 day Public Notice (consultation)
- Review of comments received
- Ministerial approval
- Published in the Royal Gazette
- Regulation implemented
Nova Scotia Code System

- To be kept up to date on Nova Scotia changes you can subscribe to NSCode.

- Send an e-mail with your name in the body of the e-mail to join-nscode@lists.gov.ns.ca

- Or go to this web page. https://novascotia.ca/dma/firesafety/BuildingCode/bcodelist.asp
History of Energy Codes

• 1974 – Department of Energy, Mines and Resources requested a committee to draft guidelines for energy efficiency for government buildings

• Associate Committee on the National Building Code (ACNBC) given a mandate
History of Energy Codes

• Standing Committee on Energy Conservation in Buildings
  – First meeting took place in November 1976
  – Code was based on ASHRAE 90.1 standard
  – Prescriptive measures

• Fall of 1977 – First draft was released for public comment
History of Energy Codes

- Second edition was published in 1983
  - New section for houses
  - Only province to adopt was Quebec with some modifications
  - 1990 Ontario Building Code included insulation levels for houses based on 1983 edition
  - CMHC required compliance for housing financed under National Housing Act
History of Energy Codes


- Prescriptive approach: Building envelope, HVAC, lighting, electrical power and service water heating
- Engineered approach: “Performance Compliance for Buildings
History of Energy Codes

• These Codes were not widely adopted
• However this “national standard” for building energy performance did influence how buildings were designed going forward
• Utilized by many provinces and municipalities for public buildings
• Influenced LEED Canada requirements
History of Energy Codes

In June 2005 the CCBFC put forward a motion to support the work to revise the MNECB 1997 provided the necessary support and funding is provided from NRCan and/or others
History of Energy Codes

Building Energy Codes Collaborative (BECC)
– Funded by NRCan
– Put together a business plan
– Provincial/Territorial Support

Developed and presented a plan to update the MNECB 1997 to the CCBFC
History of Energy Codes

- Standing Committee on Energy Efficiency formed in 2007
- First meeting was held in December 2007
NECB Approach

- Energy used by the building
  - Energy source neutral

- Based on climatic zone
  - Heating degree-days (HDD)
NECB Approach

- Silent on renewable, waste or site-generated energy

- Wide variety of technology
- Didn’t place barriers for use
- Reference standards for use not efficiency
- Silent on most process loads
  (except pools and ice surfaces)
NECB Approach

• Used the same structure as the MNECB

- Part 3: Building Envelope
- Part 4: Lighting
- Part 5: Heating, Ventilation and Air-Conditioning (HVAC)
- Part 6: Service Water Heating
- Part 7: Electrical Power Systems and Motors
- Part 8: Performance Path
NECB Compliance Paths

• Prescriptive Path
• Building envelope trade-off path
  ➢ Simple
  ➢ Detailed
• Lighting, HVAC and Service water trade-off path
• Performance path
  ➢ Whole building modelling
NECB Compliance Paths

NECB 2011

- Select Code Part
  - No
  - Performance Path?
    - Yes
      - Energy Calculations
      - Redesign
    - No
      - Part 3, 4, 5, or 6
        - Trade-Off
          - Yes
            - Trade-Off Calculations
          - No
            - Prescriptive Compliance
            - Prescriptive Compliance
              - NECB Compliant?
                - Yes
                - Stop
                - No
                  - Loop for Each of Parts 3, 4, 5, 6
                    - Yes
                      - NECB Compliant?
                        - Yes
                          - Stop
                        - No
                          - Prescriptive Compliance
                    - No
                      - Prescriptive Compliance

- Part 7

Stop
NECB Compliance Paths

- Mix and match simple prescriptive and trade-off paths
- Trade-off within the same Part only
NECB Compliance Paths

- Cannot mix any other path with the performance path
- Whole building approach
NECB Performance Level

- Consistent minimum acceptable performance level for all compliance paths
- Established based on the minimum prescriptive path requirements
NECB 2011 vs MNECB

26% overall performance improvement
NECB 2011 vs MNECB

Performance Improvement over MNECB by City
Nova Scotia Part 10


The following Objectives were added to the Nova Scotia Code:

- Resource Conservation
- Water Conservation
- Energy Conservation
Nova Scotia Part 10

Applied to housing and small nonresidential buildings (Part 9).

Exempted

- Farm buildings
- Manufacturing or commercial/industrial processing
- Non heating season or intermittently occupied buildings
- Heritage buildings
Nova Scotia Part 10

Water Efficiency

Required all shower heads, lavatory and kitchen faucets to meet maximum flow rates:

Lavatory: 8.35 L/min
Kitchen: 8.35 L/min
Shower: 9.5 L/min
Nova Scotia Part 10

Water Efficiency

Required all toilets and urinals to meet maximum flow rates:

Toilets: 6 L/flush  
Replacements: 13.25 L/flush  
Urinals: 3.8 L/flush  
5.68 L/flush

Also required urinals with automatic flushing devices to be controlled to prevent flushing during building downtime

Allowed for water free urinals to be used
Nova Scotia Part 10

Compliance with Part 10

Prescriptive measures, or

Performance protocol that will achieve the minimum equivalent energy conservation as Part 10
Section 9.36. (NBC)

This section replaced Part 10 of the Nova Scotia Building Code Regulations
Became effective on December 31, 2013 (N.S. Reg. 330/2013)
Section 9.36. also referenced the NECB 2011 as a compliance path
Water efficiency was not covered and it remained in the Nova Scotia Building Code until April 1, 2017.
Section 9.36.

The biggest change was in how the insulation was calculated. Effective Thermal Resistance now applied.

2 x 6 wall construction
Insulation R value = 20

Exterior siding (R=0.6)

1/2“ plywood (R=0.6)

2 x 6 studs (R=6.4)

6” insulation (R=20)

Effective R = 18.1 (24” spaced stud)

= 17.3 (16” spaced stud)

= 16.6 (12” spaced stud)

Vapour barrier

1/2” drywall (R=0.6)
Section 9.36.
NECB 2011 – Scope

The regulation also referenced the NECB 2011 which became effective on December 31, 2014 for large buildings.

• Covers new buildings under Part 3 of the NBC
• Additions
• Does not apply to farm buildings or renovations to existing buildings
NECB – Building Envelope

• Part 3 is concerned with the transfer of heat and air through the building envelope
  ➢ Building materials
  ➢ Building components
  ➢ Building assemblies
  ➢ Interface between the above items
NECB – Building Envelope

• Prescriptive requirements
  ➢ Protection of insulation materials
  ➢ Continuity of insulation
  ➢ Thermal characteristics of building envelope
  ➢ Allowable area of windows and doors
  ➢ Air leakage
NECB – Building Envelope

- Trade-off paths
  - Simple
  - Detailed

Prescriptive = 40%

Trade-off = 65%
By providing better windows and wall insulation
NECB – Lighting

- Part 4 applies to lighting components and systems connected to the building’s electrical service.

- Exemptions:
  - Emergency lighting that is off during normal building operation
  - Lighting in dwelling units
NECB – Lighting

• Prescriptive requirements cover:
  ➢ Interior lighting power
  ➢ Interior lighting controls
  ➢ Exterior lighting power
  ➢ Exterior lighting controls

➢ There is also a trade-off path
NECB – HVAC Systems

• Part 5 addresses systems used for heating, ventilation and air-conditioning (HVAC)

• New to the 2015 edition is the inclusion of efficiency of heat rejection equipment (cooling towers), updated pipe and duct insulation requirements and others.
NECB – HVAC Systems

- Prescriptive requirements cover:
  - Heating equipment
  - Ventilation equipment
  - Air-conditioning equipment
  - HVAC control systems
  - Piping and ducts forming part of the system

Offers a trade-off path
NECB – SWH Systems

- Part 6 addresses service water heating (SWH) systems:

- Service water means water for plumbing services excluding systems exclusively for space heating/cooling or for processes.
NECB – SWH Systems

• Prescriptive requirements cover:
  ➢ Water heating equipment (domestic water)
  ➢ Piping insulation
  ➢ Control systems
  ➢ Water flow
  ➢ Pressure Booster Systems (New 2015)

Offers a trade-off path
NECB – Electrical Power Systems and Motors

- Part 7 applies to electrical power systems and motors connected to the building’s electrical service.
NECB – Electrical Power Systems and Motors

• Prescriptive requirements cover:
  ➢ Electrical distribution system
  ➢ Voltage drop – Feeders and branch circuits
  ➢ Transformers
  ➢ Electrical motors

There is NO trade-off path in Part 7
NECB – Electrical Power Systems and Motors

Performance Path

- Reference Building built to prescriptive path
- Proposed building modeled against reference building

Compliant if proposed building uses equal or less energy
Supporting documents and tools

- NECB User’s Guide
- CAN-QUEST Software
- Trade-off Path Tools
  - Lighting (Part 4)
  - HVAC (Part 5)
  - SWH (Part 6)
- Compliance Checklists

These are for the 2011 edition with the 2015 edition available shortly.
Moving forward: NECB 2015+

- Changes to the NECB 2015 will be published later this year.
- Will further the energy efficiency of buildings in the neighbourhood of 8%
- These changes will be reviewed by the NSBAC once they are published
2015 National Plumbing Code

Water Efficiency

Required all shower heads, lavatory and kitchen faucets to meet maximum flow rates:

Lavatory: 5.7 L/min private 1.9 L/min public
Kitchen: 8.3 L/min except ICI kitchens
Shower: 7.6 L/min
2015 National Plumbing Code

Water Efficiency

Water Closets (toilets)
Residential: 4.8 L/flush
Dual flush of 6.0/4.1 L/flush permitted
ICI: 6.0 L/flush
Urinals: 1.9 L/flush
Moving forward: NECB 2020+

1. Moving towards Net-Zero Ready for new buildings
2. Retrofitting of existing buildings
3. High efficiency equipment and appliances
4. Further research and development for efficient buildings
5. Other developments/topics for discussion
Moving forward: NECB 2020+

1. Moving towards Net-Zero Ready for new buildings

- Development of tiers (probably 4) of more stringent model building/energy codes
- Allows the provinces/territories to keep moving towards the net zero ready goal
- Keeps the energy efficiency requirements consistent within the model codes
- Recognizes that P/T are all in different places currently with regard to energy efficiency
Moving forward: NECB 2020+

1. Moving towards Net-Zero Ready for new buildings

This stepped process is critical due to the differences in where provinces are:
Nova Scotia adopted Section 9.36. (NBC) in 2013
Manitoba adopted Section 9.36. in 2016
Alberta adopted Section 9.36. in 2016
Saskatchewan is proposing adoption in 2019
2. Retrofitting of existing buildings

- Labelling energy use in buildings through expansion of tools such as EnerGuide and ENERGY STAR Portfolio manager
- Introducing codes for existing buildings
- Offering financial incentives for retrofits
3. High efficiency equipment and appliances
   • Set new national standards on the minimum energy performance of key technology such as heating equipment
4. Further research and development on efficient buildings

• Traditionally building codes lag what industry is doing and set the minimum established practice by industry.

• By developing energy code pathways it changes the dynamic from codes that follow industry to codes that set the direction for industry.

• CHBA is piloting a program to provide a pathway to NZR and NZ homes complete with Energy Labelling Program.
Moving forward: NECB 2020+

5. Other developments/topics for discussion

• Maximizing the energy efficiency of buildings (passive house), or
• Focus on combination of energy efficiency and renewable energy production (net zero)
• Some buildings may not be suitable for renewable energy (not enough space, lack of solar access)
Moving forward: NECB 2020+

5. Other developments/topics for discussion

• Carbon intensity – not currently addressed in Canadian Codes or is planned to be

• As buildings move towards net-zero energy ready, the fuel source becomes primary driver of carbon intensity

• Oil is more carbon intensive than natural gas

• A building can be net zero but if it uses fossil fuels it isn’t carbon neutral

• Electrical grid also plays a roll in decarbonizing the energy used by buildings
5. Other developments/topics for discussion
   • Existing buildings – currently a working group looking at existing buildings as they offer the greatest gains in terms of energy efficiency
   • This would have to happen during renovation stage as building code cannot require retroactive updating

   • Statistic indicate half of all of Canada’s housing was built before 1985
   • 57% of all commercial were built before 1980
In order to move forward it will require significant collaboration across all governments (municipal/provincial/federal)
Questions?