An Introduction to Climate Change through Codes, Standards, & Regulations

RRC POLYTECH

Associated
STRATEGIC ADVISORY SERVICES

ENGINEERS GEOSCIENTISTS MANITOBA

MANITOBA CLIMATE RESILIENCE TRAINING

Interaction

- The course is being **recorded**
- **Cameras** and **Microphones** are **off**
- **Polls** and **Breakout Session** to receive your ideas
- **Chat is open**
  - During Presentation and Q&A
  - Comments are welcome and will be monitored
  - Please send comments to **Everyone**
- Technical issues – send chat to **EngGeoMB**
- Follow-up handout with **survey**
  - Change **your name** in Zoom

Agenda

- **Overview**
- **Current State / Changes / Challenges & Opportunities**
  - Transportation
  - Water, Storm Water, Water Supply, & Wastewater
  - Buildings (2020 Code Tiers)
- **Breakout room discussions**

Presenters

- **Tammy Harper, M.Ed.**

  Overview & Buildings

- **Kris Maranchuk, P.Eng.**

  Transportation

- **Jeff O’Driscoll, P.Eng.**

  Water, Storm Water, Water Supply, & Wastewater

Poll

POLL QUESTION: Which of the 3 topic areas interests you most?

- Transportation
- Water
- Buildings

MANITOBA CLIMATE RESILIENCE TRAINING

Understanding Codes, Standards and Regulations (CS&R)

- Acts
- Regulations
- Codes
- Standards

* Definition and description of these legislated entities as related to buildings are similar for all sectors

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Understanding Codes, Standards & Regulations

Act

- A law enacted by the Legislative Assembly
- Also called a Statute
- A Bill becomes an Act when it receives Royal Assent and is Proclaimed

Two primary Manitoba Acts which govern buildings

- The Buildings and Mobile Homes Act
- The Fires Prevention and Emergency Response Act

Understanding Codes, Standards & Regulations

Regulation

- A delegated legislation
- Made by a person or body under the authority of an Act passed by the Legislature
- The regulation-making body is specified by the Act

Regulations under The Buildings and Mobile Homes Act

- Building Fees Regulation
- Designated Buildings Regulation
- Manitoba Building Code
- Manitoba Plumbing Code
- Mobile Homes Standards and Permits Regulation

Understanding Codes, Standards & Regulations

Code

- A set of rules
- Adopted by provincial Regulation

THE BUILDINGS AND MOBILE HOMES ACT
(C.C.S.M. c. B93)

Manitoba Building Code

Regulation 31/2011
Registered March 28, 2011

Adoption of *National Building Code of Canada 2010*

1 Subject to the amendments set out in the Schedule to this regulation, and to sections 1.1 and 2.1, the *National Building Code of Canada 2010*, issued by the Canadian Commission on Building and Fire Codes, National Research Council Canada, is adopted as the building code in Manitoba.

Understanding Codes, Standards & Regulations

Standards - establish accepted practices, technical requirements and standard terms for diverse fields

Technical standard - an established norm or requirement regarding technical systems

Code – WHAT you MUST do Standard – HOW you will do it

Current Practices & Upcoming Changes

- Transportation Infrastructure

Presenter: Kristopher Maranchuk

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Current Practices & Upcoming Changes

Current Practices

- **Acts:**
  - Manitoba Highway Traffic Act
- **Regulations:**
  - No specific regulations outside of the Highway Traffic Act (Provincial / Territorial governments are responsible for and have primary jurisdiction over the planning, design, construction, operation, maintenance and financing of highways within their jurisdiction)
- **Codes:**
  - No specific codes exist for roads (not part of any building codes)
  - Bridges are either AASHTO LRFD Bridge Design Specifications or Canadian Highway Bridge Design Codes

Current Practices & Upcoming Changes

Current Practices

- **Standards / Specifications:**
  - Developed by each provincial / territorial jurisdiction
  - Manitoba Standard Construction Specifications and City of Winnipeg Standard Construction Specifications
  - Most municipalities follow these two specifications depending upon their application
- **Best Practices:**
  - Guide the industry as a whole and are typically followed and enforced but not officially recorded

Current Practices & Upcoming Changes

Upcoming Changes

- **Standards / Specifications:**
  - Public agencies are shifting towards more sustainable materials and specifications
    - Greener concrete, asphalt, specification alignment, etc.
    - Recent example: City of Winnipeg Portland Cement Concrete Specification changes (December 2022)
- **Regulations:**
  - 2023 Canada Federal Carbon Tax changes may affect how infrastructure regulations are developed
  - Cost of construction is increasing

Current Practices & Upcoming Changes

Upcoming Changes

- **Partnerships:**
  - Government of Canada Budget 2022 increased funding to promote commercialization and deployment of low-carbon technologies and resources
    - Government of Canada and Cement Association of Canada partnership launched a roadmap to Net-Zero Carbon Concrete by 2050

Current Practices & Upcoming Changes

Currently Followed Guidelines / Standards

- **Testing Methods Guidelines and Standards**
  - Canadian Standards Group (CSA)
  - American Association of State Highway and Transportation Officials (AASHTO)
  - ASTM International (formerly American Society for Testing and Materials)
- **Roadway Design Standards**
  - Geometric Design Guide for Canadian Roads - Transportation Association of Canada (TAC)
  - Agencies free to adapt based on geographic location and specific applications (ex: Manitoba Transportation & Infrastructure “Blue Sheets”)

Current Practices & Upcoming Changes

Currently Followed Guidelines / Standards

- **Bridge Design Standards**
  - AASHTO LRFD Bridge Design vs. Canadian Highway Bridge Design Code (CSA S6:19)
  - Uses a global or Load and Resistance Factor Design Methodology
  - Agencies are free to make changes to the standards based on geographic location and specific applications
- **Roadway Traffic Control Device Standards**
  - Manual of Uniform Traffic Control Devices for Canada (MUTCDC)
  - Manitoba Work Zone Traffic Control Manual
  - Use to provide guidance on signs, delineation, etc.

High Level Challenges and Opportunities

Challenges:

- Regulatory bodies are reluctant to change
  - Need a ‘top – down’ approach
- Industry is semi-reluctant to change
  - Cost – benefit analyses need to be performed
- Climate change and resilience is a long-term goal
  - Short-term benefits?
  - Initial investments?
  - Non-renewable materials are becoming harder to source

High Level Challenges and Opportunities

Opportunities:

- Infrastructure is vital to our supply chain
- Many industry groups are looking at changes to become ‘greener’
  - Regulatory agencies need to adapt
- Many working groups are being formed (even locally) to discuss climate change and greener processes / materials
  - Concrete, Asphalt, Recycled Materials, etc.

Emerging Trends in Transportation Infrastructure

Emerging Trends:

- Manitoba Government Initiatives
  - Regulatory - Bill 20, The Vehicle Technology Testing Act, received Royal Assent on May 20, 2021
  - Automated and connected vehicles
  - “End-Product” Construction Specifications
- Electrification of vehicles and equipment
  - Reduced emissions versus fossil fuel options
  - No universal standards for this initiative (difficult to recycle)

Emerging Trends in Transportation Infrastructure

Emerging Trends:

- Automated machine control
  - Prevents instances of re-work that are required due to not meeting specifications
- New inspection and testing technologies
  - Augmented reality, virtual reality, drones, etc.
  - Reducing carbon footprints through computer-based processes

Current Practices & Upcoming Changes

- Water
  - Water Management
  - Water Supply & Treatment

Presenter: Jeff O'Driscoll

Associated Engineering

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Current Practices & Upcoming Changes

Current Practices - Water Management

- Regulations
  - Many related to resource management.
  - Do not provide specific guidance on Climate Change
- Codes
  - Not codified area of Infrastructure
- Standards
  - New Standards on Flood Resilient Design of Communities and IDF Curves
- Best Practices
  - Most CC guidance through best practices
  - CWRA, CWWA, Dam Safety Association, Intact Centre, etc.
- Government Strategies
  - Manitoba's Water Management and Water Action Plan

Current Practices & Upcoming Changes

Current Practices - Water Supply and Treatment

- Regulations
  - Safe Drinking Water Act, Environment Act
  - Do not provide specific guidance on Climate Change
- Codes
  - Building Code, Plumbing Code, Energy Code, etc.
- Standards
  - Flood Resilient Design of Communities and IDF Curves
  - AWWA, CSA, NSF
- Best Practices
  - Most CC guidance through best practices
  - CWWA, Intact Centre, etc.

Current Practices & Upcoming Changes

Standards

- Canadian Standards Association
  - **CSA W204:19** Flood Resilient Design of new Residential Communities
  - **CSA W210** Prioritization of Flood Resilience Work in Existing Residential Communities (Publication Pending)
  - **CSA W211** Management Standard for Stormwater Systems (Publication Pending)
  - **CSA PLUS 4013:19** Development, interpretation and use of rainfall intensity-duration-frequency (IDF) information
  - **CSA W200-18** Design of Bioretention Systems
  - **CSA W201-18** Construction of Bioretention systems
  - **CSA S900.1:18** Climate change adaptation for wastewater treatment plants
  - **CSA W203:19** Planning, design, operation, and maintenance of wastewater treatment in northern communities using lagoon and wetland systems

Current Practices & Upcoming Changes

Best Practices

- Government of Canada National Adaptation Strategy & Adaptation Action Plan
- Standards Council of Canada
  - Guide for Integrating Climate Change Adaptation Considerations into Canadian Standards
- Ouranos
  - Standardization guidance for weather data, climate information and climate change projections
- Engineers Canada
  - Developing a Stormwater Quality Management Standard considering a Changing Climate
- Intact Centre for Climate Adaptation
  - Developing Canadian Standard for New Flood Resilient Residential Communities and Existing Communities

Current Practices & Upcoming Changes

Best Practices

- Intensity-Duration-Frequency (IDF) Tools
  - IDF-CC Tool 5.0- Western University, Institute for Catastrophic Loss Reduction and Facility for Intelligent Decision Support
  - CSA PLUS 4013:19 Development, interpretation and use of rainfall intensity-duration-frequency (IDF) information

Current Practices & Upcoming Changes

Best Practices

- Flood Hazard Mapping
  - Critical for understanding risk and guiding future development
  - Strong push to produce flood hazard maps for communities
  - Inventory of methods for estimating climate change-informed design water levels for floodplain mapping (NRC, March 2019)
- Dam Safety
  - Ouranos
    - Flood Frequency Analysis and Dam Safety in the 21st Century Climate (2021)
    - Probable Maximum Floods and Dam Safety in the 21st Century Climate (2015)

Current Practices & Upcoming Changes

Best Practices

- Water Management Hydrology
  - Climate Adaptation though ‘Brute Force’
  - Increase design threshold (e.g. 1:100 to 1:200)
  - Heavy analysis or no regrets action (more resilience – 10% safety factor – rule of thumb).
  - Act and then prove later and tweak
- Water Supply and Treatment
  - Incorporate Climate Risk Assessment in Operation, Planning and Design.
    - PIEVC
    - ISO Standards 14090, 14091 and 31000
    - Climate Projections - Confidence levels tiers -Low (T3) to High (T1)
  - Water Distribution Systems
    - Climate Change Risks and Opportunities (NRC 2022)

Current Practices & Upcoming Changes

- Buildings

Presenter: Tammy Harper

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Buildings - Current Practices & Upcoming Changes

Current Practices

- Climate-Resilient Buildings and Core Public Infrastructure Initiative
- 2020 Codes
- Acts and Regulations in MB
- Code Development System update

Upcoming Changes

- Future changes
  - 2025 and 2030 Codes

Current State of Codes

The Climate-Resilient Buildings and Core Public Infrastructure Initiative

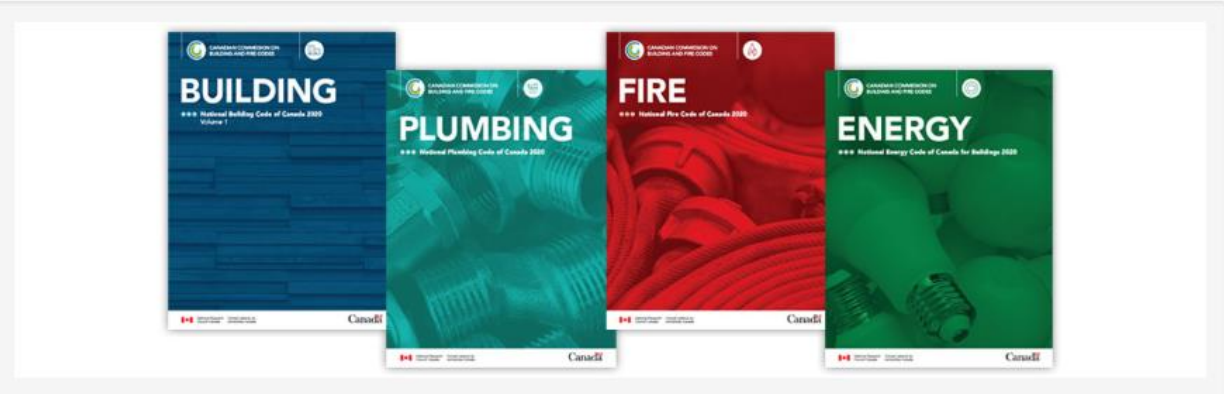
Some Key Projects:

- Climatic Data and Loads
- Flooding – Code changes (2025 cycle), Guidelines, and Best Practices for flood reduction
- Wildland Urban Interface Fires – National Guidelines, Code Changes (2025 Cycle)

Current Practices & Upcoming Changes

2020 Codes

- Published in March 2022
- There are approximately 22 changes in Section 9.36 (NBC) and NECB and 20 in the NPC



Current Practices & Upcoming Changes

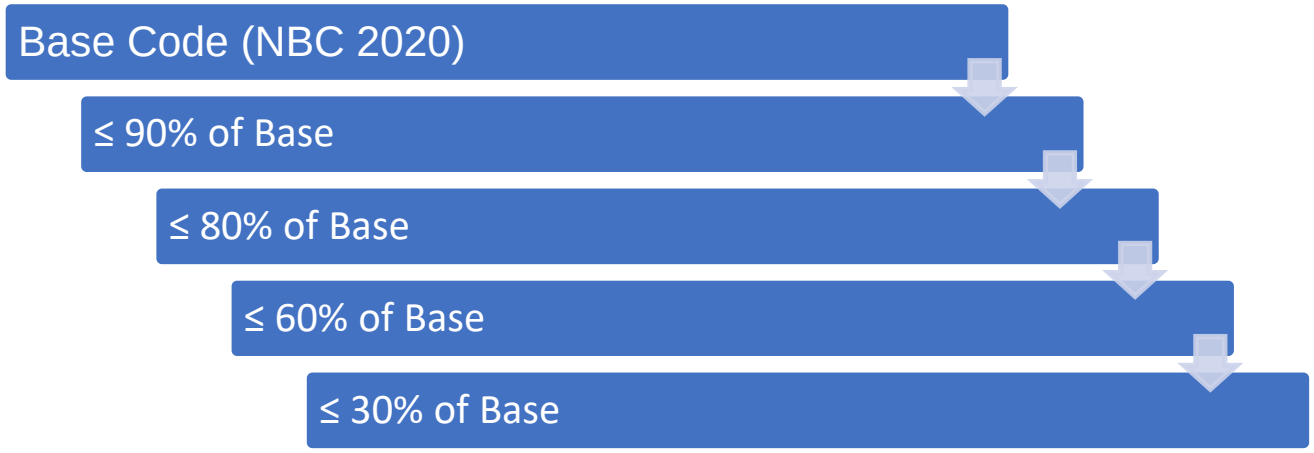
2020 Codes – NPC

- Introduces requirements for Rainwater Harvesting

Current Practices & Upcoming Changes

2020 Codes - Part 9

- Whole building airtightness testing as an option
- Alignment with NRCan's ENERGuide Rating System
- Equipment performance for HVAC and SWH
- Introduced Tiered Energy Codes for housing



Current Practices & Upcoming Changes

2020 Codes - NECB

- Application statement
- Air leakage was revamped from 2017.
- Whole building air tightness testing as an option
- Thermal transmittance values of windows and doors decreased

Current Practices & Upcoming Changes

2020 Codes - NECB

- Thermal transmittance of Above Ground building assemblies were reduced

Assembly	Zone 7A				Zone 7B				Zone 8			
	2011	2015	2017	2020 (Tier 1)	2011	2015	2017	2020 (Tier 1)	2011	2015	2017	2020 (Tier 1)
Walls	R27	R27	R27	**R26**	R27	R27	R27	**R30**	R31	R31	R31	**R34**
Roofs	R31	R31	R41	**R47**	R35	R35	R41	**R49**	R40	R40	R47	**R52**
Floors	R31	R31	R35	**R41**	R35	R35	R35	**R47**	R40	R40	R40	**R49**

Current Practices & Upcoming Changes

2020 Codes - NECB

- Table 3.2.2.3 Overall Thermal Transmittance of Fenestration

Assembly	Zone 7A				Zone 7B				Zone 8			
	2011	2015	2017	2020	2011	2015	2017	2020	2011	2015	2017	2020
Vertical Fenestration	2.2	2.2	1.9	**1.73**	2.2	2.2	1.9	**1.44**	1.6	1.6	1.4	**1.44**
Skylights	2.2	2.2	1.9	**2.41**	2.2	2.2	1.9	**2.01**	1.6	1.6	1.4	**2.01**

Current Practices & Upcoming Changes

2020 Codes - NECB

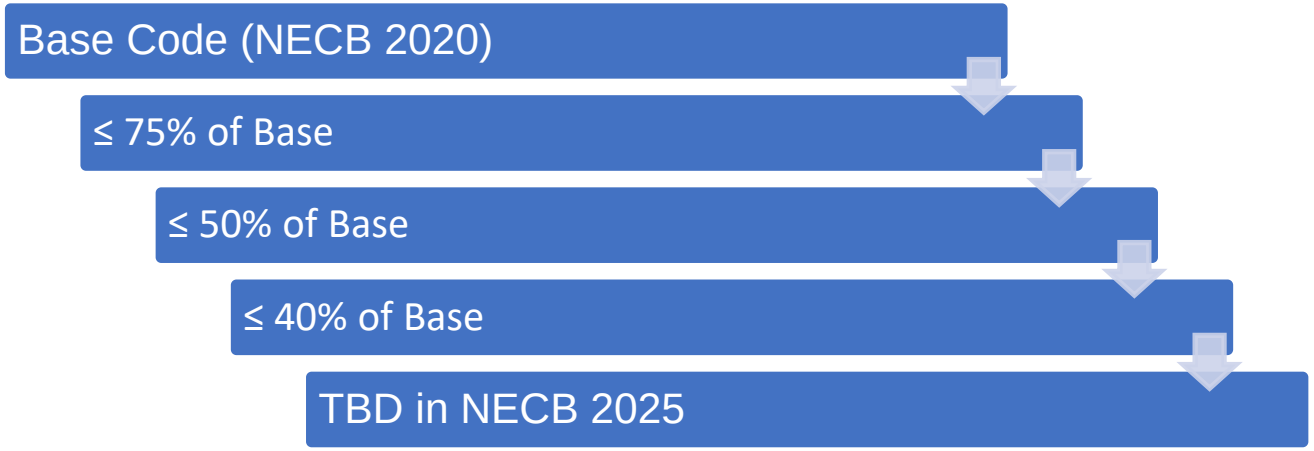
- Table 3.2.2.3 Overall Thermal Transmittance of Doors

Assembly	Zone 7A				Zone 7B				Zone 8			
	2011	2015	2017	2020	2011	2015	2017	2020	2011	2015	2017	2020
All Doors	2.2	2.2	1.9	**1.9**	2.2	2.2	1.9	**1.9**	1.6	1.6	1.4	**1.44**

Current Practices & Upcoming Changes

2020 Codes - NECB

- Lighting power densities in Part 4 were updated
- Equipment performances for HVAC and SWH
- Introduced Tiered Energy Codes for buildings

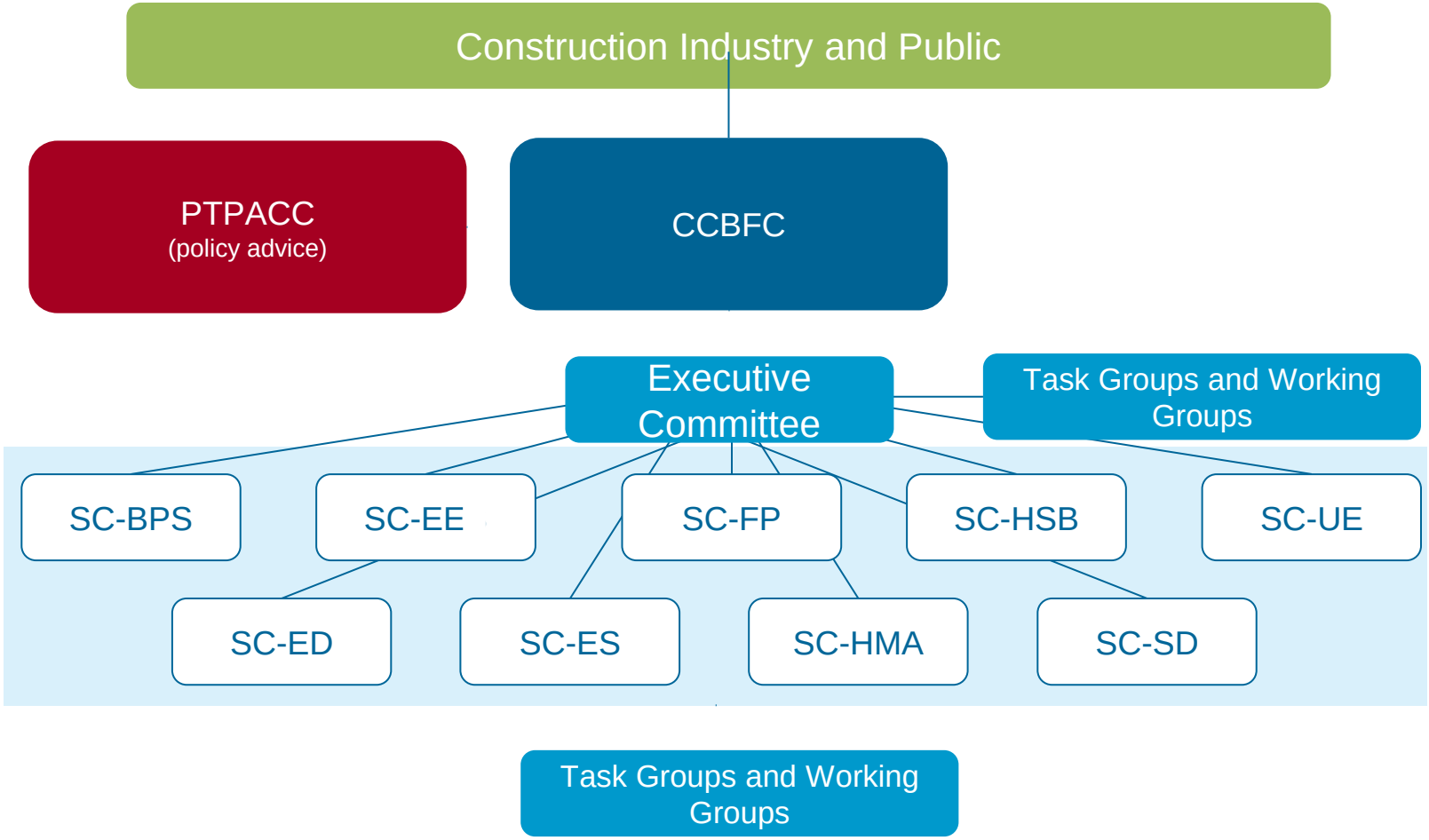


Current Practices & Upcoming Changes

Province of MB

- No new Regulations for Climate Change, Resiliency or Mitigation
  - Building and Mobile Homes Act
  - Climate and Green Plan Act
  - Energy Act

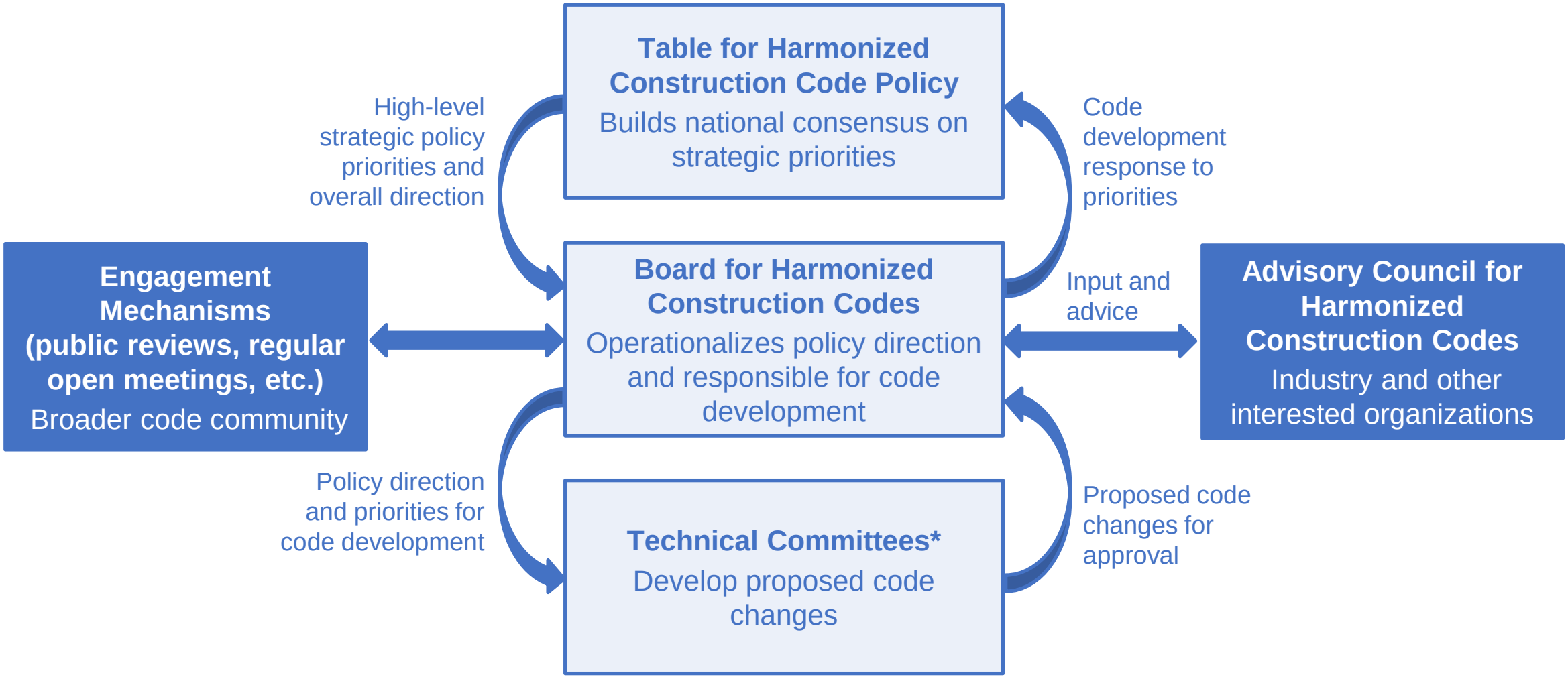
Current Practices and Upcoming Changes



Standing Committees

- Building and Plumbing Services (SC-BPS)
- Energy Efficiency (SC-EE)
- Earthquake Design (SC-ED)
- Environmental Separation (SC-ES)
- Fire Protection (SC-FP)
- Hazardous Materials and Activities (SC-HMA)
- Housing and Small Buildings (SC-HSB)
- Structural Design (SC-SD)
- Use and Egress (SC-UE)

Transformed Governance Model



*** Existing standing committees for the 2020-2025 cycle**

High Level Challenges and Opportunities

Highlights of future codes for Energy Efficiency

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