

Energy Codes and Development

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Policies and Practices**

Outline of the Session

Overview of Changes for Small and large residential buildings

- ▶ Examples of key changes
- ▶ The impact of key changes on development planning
- ▶ Changing housing forms
- ▶ Coming in the future

Effective Date

- ▶ **9.36: November 1, 2016**
- ▶ **NECB: November 1, 2016**
 - ❖ **Permits applied for after these dates**

NECB and 9.36

NECB- Separate Document

- ▶ **Building Envelope**
- ▶ **HVAC**
- ▶ **Service water**
- ▶ **Lighting**
- ▶ **Electrical Distribution & motors**
- ▶ **Building Operation**

9.36 – Included in the ABC

- ▶ **Building Envelope**
- ▶ **HVAC efficiencies**
- ▶ **Service hot water**

Scope Continued

▶ Does not include:

- ❖ Storage and parking garages (large)
- ❖ Small service rooms
- ❖ Unconditioned spaces
- ❖ Log wall assemblies

Three Compliance Paths

▶ Prescriptive path

- ❖ No specific ENERGUIDE target
- ❖ No air leakage targets
- ❖ Implied wdw/wall ratios

▶ Trade-off option

▶ Performance Path – Energy Modeling

- ❖ Comparison against a “reference house”
- ❖ Energy target = annual energy consumption of reference house
- ❖ Air change rate of 3.2 or 2.5 or tested

Climatic Zones

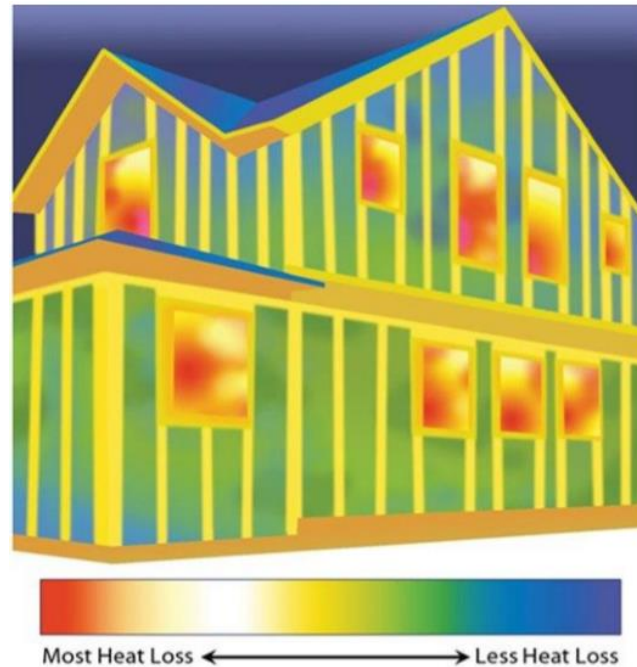
Division B, Appendix C

Climate Zone, Heating Degree Days °C

Zone 4	Zone 5	Zone 6	Zone 7a	Zone 7B	Zone 8
≤ 3000	3000 to 3999	4000 to 4999	5000 to 5999	6000 to 6999	≥ 7000
		Lethbridge Medicine Hat	Edmonton Red Deer Calgary Grande Prairie Cold lake	Ft. McMurray Athabasca Bonnyville Peace River	

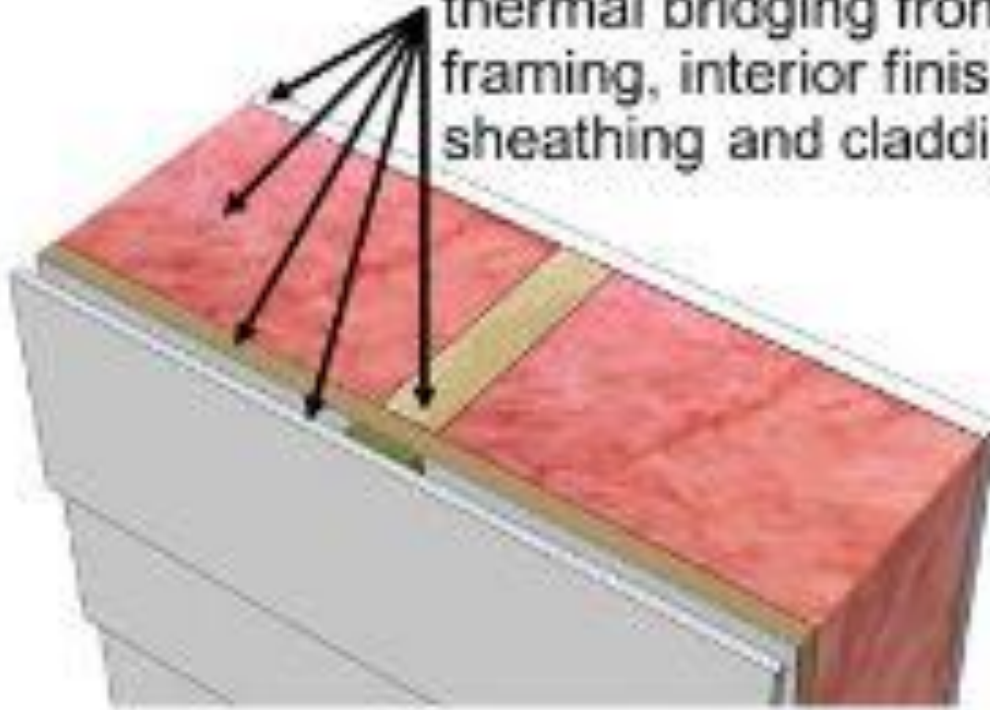
How Did EE Change Construction?

- ▶ Less heat loss through framing
- ▶ More insulation
- ▶ Higher trusses
- ▶ Better windows



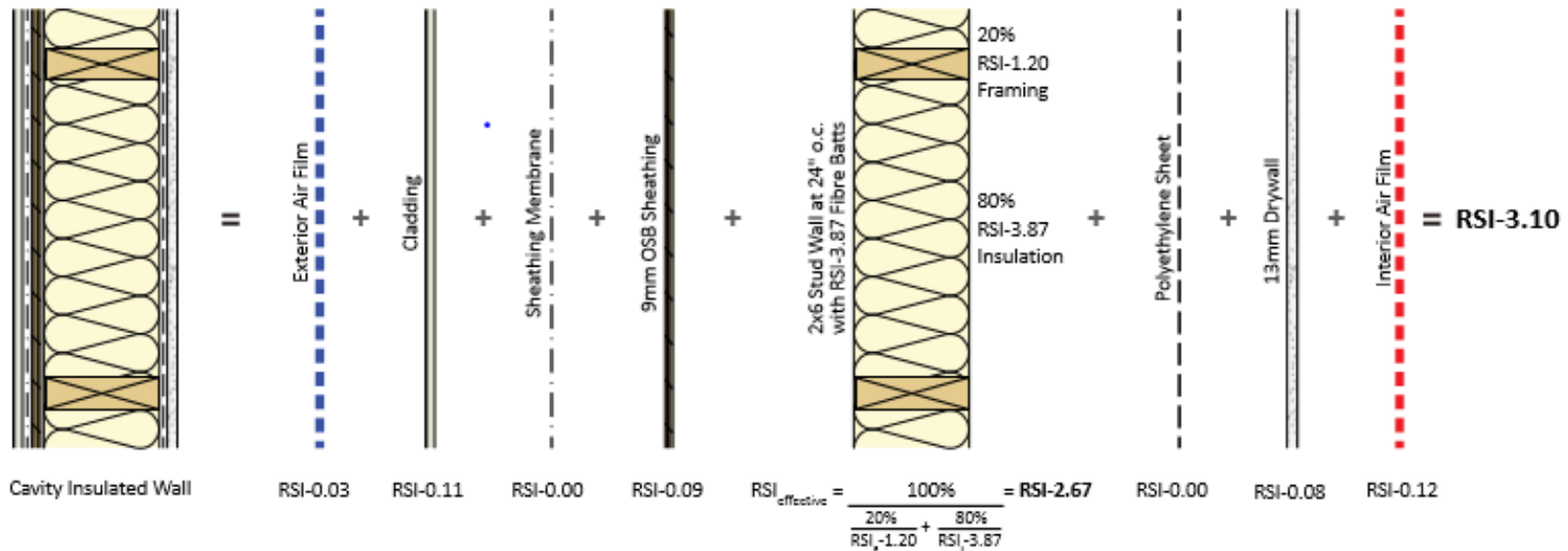
Effective Insulation

Effective insulation accounts for insulation, thermal bridging from framing, interior finish, sheathing and cladding



Overall RSI Value

Cavity Insulated Wall Assembly

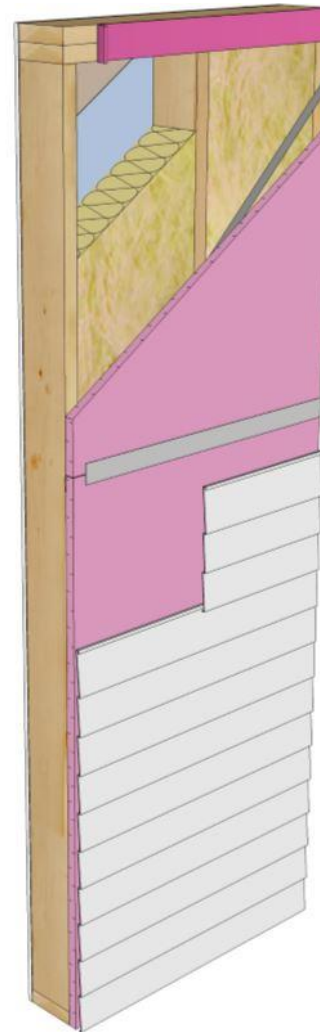


Note #5 | For wall assemblies with no exterior vented air space behind the cladding, the insulation value of the cladding can be included in the effective RSI value calculation.

Changing Construction

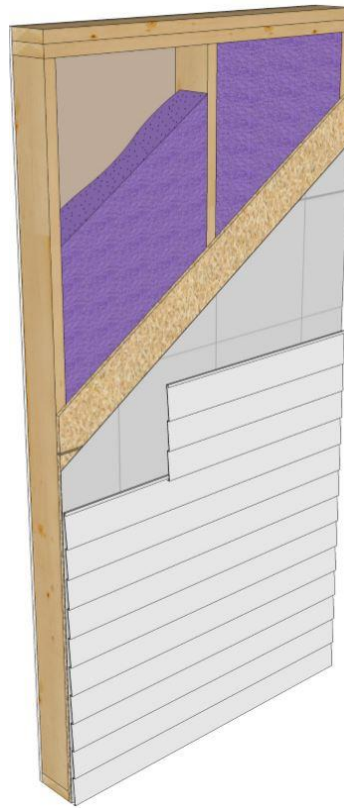
Above Grade

- ▶ Moving insulation to the outside
- ▶ What conflicts does this pose?



Changing Materials

- ▶ Higher R-value materials
- ▶ More combustible
- ▶ Health and safety changes




Foundation Changes

- ▶ Moving insulation
- ▶ More insulation
- ▶ Thicker walls
- ▶ Development challenge?



Compliance

- ▶ Forms to capture code required info.
- ▶ Various levels of detail based on compliance path
- ▶ Energy Advisors may be involved



9.36 Project Summary

Compliance Submission Report

City of Calgary Requirements for ABC 2014 Division B 9.36 Compliance
Please read the 9.36 Project Summary User Guide for help in completing this form.

Project Name:		Building permit file number (completed internally)
Project Address:		
Applicant:		
Applicant Address:		

Please indicate compliance path (select only one)

PRESCRIPTIVE
(complete Part A)

TRADE-OFF
(complete Parts A and B)

PERFORMANCE
(complete Parts A and C)

Part A: Basic Building Information (required for ALL compliance paths)

Climate Zone (HDD):		Building Area (m ²):	
Primary heating equipment (type and fuel):		Efficiency of primary heating equipment (%):	
(If included) Secondary heating equipment (type and fuel):		Efficiency of secondary heating equipment (%):	
Heat Recovery Ventilator (HRV) included:	Yes <input type="checkbox"/> No <input type="checkbox"/>	(If included) Efficiency of HRV equipment (%):	
Primary hot water equipment (type and fuel):		Efficiency of primary hot water equipment:	
(If included) Secondary hot water equipment (type and fuel):		Efficiency of secondary hot water equipment:	
(If included) Space cooling (type and capacity):		(If included) Efficiency of space cooling equipment:	
Hot water recirculation pump included:	Yes <input type="checkbox"/> No <input type="checkbox"/>	Primary air barrier system:	

In addition to the above, the accompanying drawings must also include the following information:

- Identify location and extent of all wall and floor assemblies containing heating pipes or electrical heating cables and membranes.
Notes / location of system (optional):
- Indicate effective Rsi values for building envelope assemblies above and below ground (e.g. walls, floors, roofs, windows and doors).
Notes/location of information (optional):
- Provide the calculations used to determine these values. May be hand calculations or from a software program.
- Provide the following architectural details in the project drawing set illustrating insulation and air barrier:
Notes / location of details (optional):
 - Attic hatch
 - Eaves to top of wall transition
 - Upper floor rim joist
 - Top of basement wall/main floor rim joist
 - Slab / footing junction
 - Cantilever floors
 - Bonus room / living space over attached garage (including ducts and insulation coverage of ducts)
 - Typical electrical junction box detail
 - Typical window / door jamb and sill detail
 - If applicable: Party wall meeting outside wall, electric meter/vent pipe/duct in insulated wall, skylight shaft walls, slab edges in walkouts and heated slabs, masonry chimneys and fireplaces.

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Development - Limiting Factors

- ▶ **Narrower lots**
- ▶ **Smaller building pockets**
- ▶ **Zero lot line**
- ▶ **Height restrictions**
- ▶ **Lot coverage**
- ▶ **Fire concerns**

The future of Housing



What is Influencing Government Environment Policy?

Federally

- ▶ 2016 Paris Accord
- ▶ Three Amigos Summit
- ▶ Vancouver Accord
- ▶ Provincial will to move forward

Provincially

- ▶ Election of NDP
- ▶ 2016 Paris Accord
- ▶ Special Interest Groups
- ▶ Synergy with other gvts federal gvts
 - ❖ Feds, munis

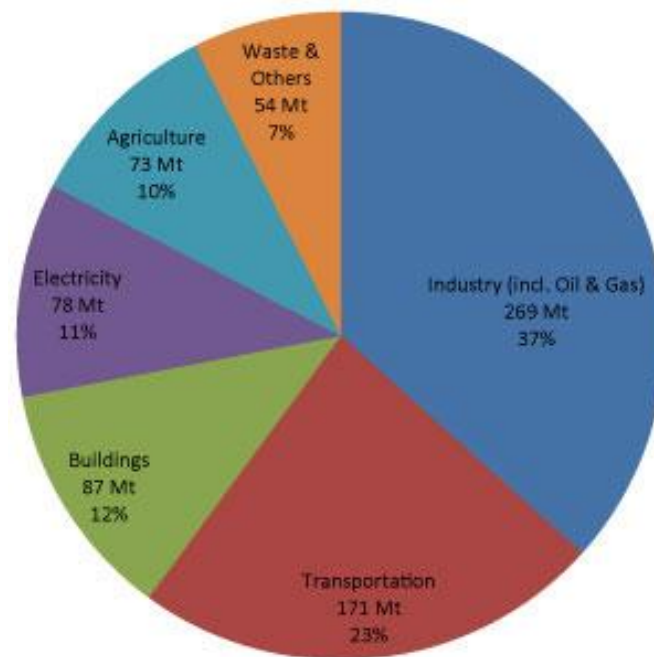
Influencers

- ▶ **Alberta Energy Efficiency Alliance (AEEA)**
- ▶ **Pacific North West Economic Region (PNWER)**
- ▶ **Pembina Institute**
- ▶ **Quality Urban Energy Systems of Tomorrow (QUEST)**
- ▶ **Leading Edge builders**
- ▶ **Technology and Service Providers, Etc.**
- ▶ **Municipalities (AUMA)**

Vancouver Accord

March 2016

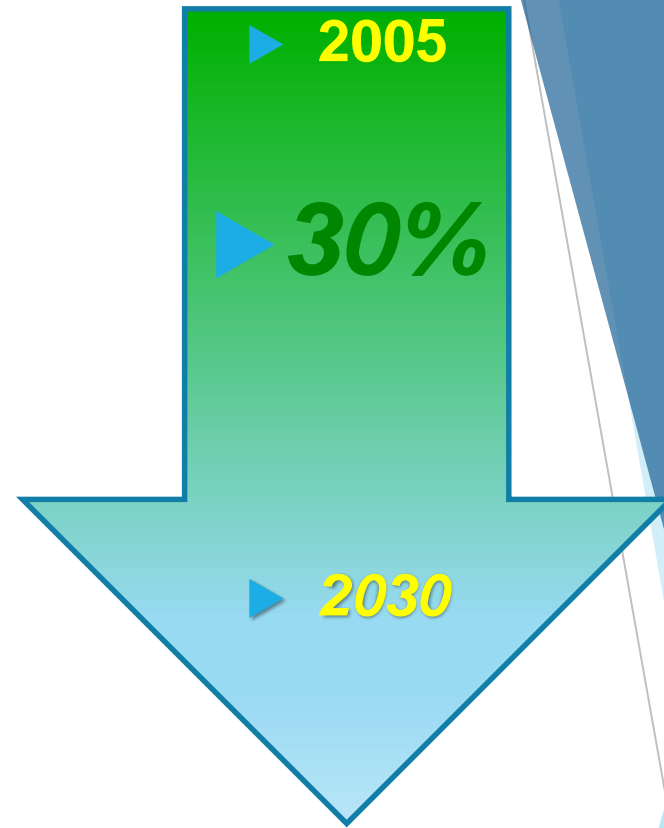
- ▶ Framework on clean growth and climate change
- ▶ Transition to a low-carbo economy



Canada's Plan

Pan- Canadian Framework

- ▶ National emissions reduction targets
- ▶ Carbon pricing
- ▶ Net Zero Ready by 2030
- ▶ Stepped Codes
- ▶ Climate Resilient infrastructure



Alberta Climate Change Plan



- ▶ Carbon Pricing
- ▶ Coal Phase Out
- ▶ Renewable Phase In

- ▶ Energy Efficiency
- ▶ Community Energy
- ▶ Energy Resiliency

- ✓ Jan 2017
- ✓ Jan 2017
- ✓ Solar Programs summer 2017
- ✓ EEA , programs 2017

Cities Driving Change



▶ Global

- ❖ Neutral Cities Alliance – global
- ❖ World Energy Cities Partnership
- ❖ Local Governments for Sustainability

▶ June 2015 Canadian Big City Mayors' Resolution

▶ Edmonton "Way We Green"

▶ Calgary

- ❖ Community GHG Reduction Plan; imagine Calgary

▶ Call for Federal support reflected in federal plan

▶ Support in Alberta Climate Change Panel Report

Cities Driving Change

- ▶ **Densification, Walkable Cities**
- ▶ **Global**
 - ❖ Neutral Cities Alliance – global
 - ❖ World Energy Cities Partnership
 - ❖ Local Governments for Sustainability
- ▶ **June 2015 Canadian Big City Mayors' Resolution**
- ▶ **Edmonton “Way We Green”**
- ▶ **Calgary**
 - ❖ Community GHG Reduction Plan; imagine Calgary
- ▶ **Call for Federal Support reflected in federal plan**
- ▶ **Support in Alberta Climate Change Panel Report**

More information

▶ AUMA references :

- ❖ [AUMA's Energy Reference Guide](#)
- ❖ [Municipal Climate Change Action Centre](#)
- ❖ [FCM Green Municipal Fund](#)

▶ AAMDC



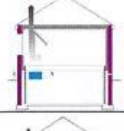
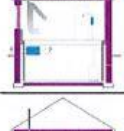
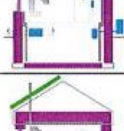
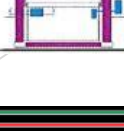
- ❖ Integrated Community Sustainability Plan Toolkit

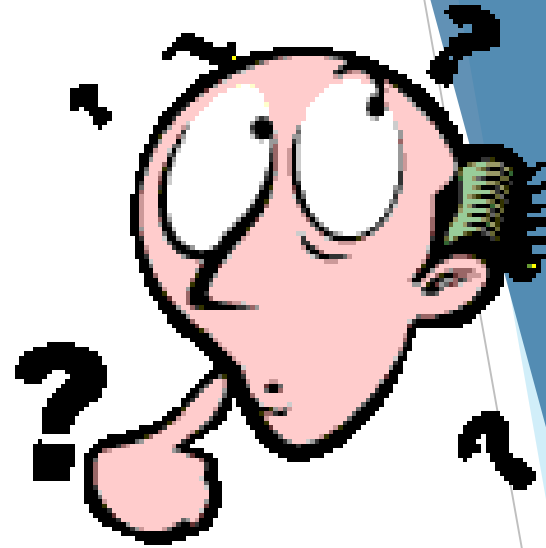
Measures for New Homes = National Codes

- ▶ **Stretch Codes B.C.**
- ▶ **Net Zero building on established programs**
 - ❖ R-2000
 - ❖ Envirohomes
 - ❖ Energy Star
- ▶ **U.S. focus on Energy Star and Zero Energy Ready**

Appendix A: Example of a potential energy code roadmap for houses

Suggested Energy Efficiency Target Values are for a new house with 223 m² floor area (2,400 sq. ft.) including 74 m² (800 sq. ft.) finished basement 2-storey house in a climate zone with the 4000-4999 Heating Degree Days.

Performance Level	Performance Goal (% energy reduction from NBC 2015)	ERS Rating	Energy Use Intensity ¹ (kWh/m ² /year)	Approximate Net Energy Consumed/yr (kWh)	Significant energy performance requirements/ improvements associated with each tier	Graphical Representation
NBC 2010	-25%	72	135	40,000 (144 GJ)	N/A	
NBC 2015 Based on Section 9.36.	0%	78	125	30,000 (108 GJ)	N/A	
Tier 1² Based on R-2000 (2005)	10%	80	110	27,000 (97 GJ)	- Exterior insulation - Heat Recovery Ventilators	
Tier 2 Based on ENERGY STAR (ON-2012)	25%	83	77	22,500 (81 GJ)	- Mandatory airtightness testing - Insulated pipes - Higher R/RSI-value exterior insulation - Higher efficiency furnace	
Tier 3 Based on R-2000 (2012)	50%	86	50	15,000 (54 GJ)	- Higher airtightness requirements - Higher R/RSI-values in roof/attic, above-ground and below-ground walls, and under basement (slabs-on-ground) - Drain water heat recovery - On demand hot water	
Tier 4 Based on EQUilibrium (no renewables)	70%	90	45	9,000 (32 GJ)	- Even higher airtightness requirements - Even higher R/RSI-values in roof/attic, above-ground and below-ground walls - Superior performance windows - Air source heat pump	
Tier 5 Based on EQUilibrium (with renewables)	70%	100	45	0 (0 GJ)	- Renewable energy systems	



***Other Issues of Interest?
Questions?***