
CASCADIA
WINDOWS & DOORS
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CASCADIA – EDUCATIONAL PRESENTATION

NAVIGATING EMERGING BUILDING ENERGY PERFORMANCE STANDARDS (BEPS)

Cost-optimizing performance through a building-envelope-first design approach

WEBINAR ADMIN

WEBINAR TECHNICAL SUPPORT -

- Technical support is available for any issues during the webinar

CONTINUING EDUCATION CERTIFICATES -

- Will be automatically emailed after the presentation

QUESTIONS -

- Feel free to post questions at any point during the presentation

AUDIO -

- We recommend using your computer audio to listen to the presentation. Calling into the presentation may incur long-distance charges from your phone provider.

AGENDA: WHAT ARE WE LOOKING AT TODAY?

- INTRO TO CASCADIA WINDOWS & DOORS
- WHY ARE NEW BUILDING ENERGY PERFORMANCE STANDARDS (BEPS) BEING INTRODUCED?
- HOW DO CURRENT BEPS DIFFER FROM PREVIOUS PERFORMANCE METRICS?
- EXPLORING DESIGN FLEXIBILITY OFFERED UNDER NEW BEPS
- INTRO TO HIGH-PERFORMANCE FENESTRATION OPTIONS
- COST OPTIMIZING HIGH-PERFORMANCE FENESTRATION OPTIONS

INTRO TO CASCADIA WINDOWS & DOORS

INTRO TO CASCADIA WINDOWS & DOORS

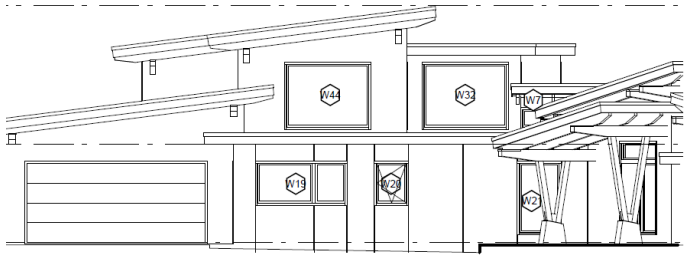
COMMERCIAL & MULTI-FAMILY

PASSIVE HOUSE & RESIDENTIAL

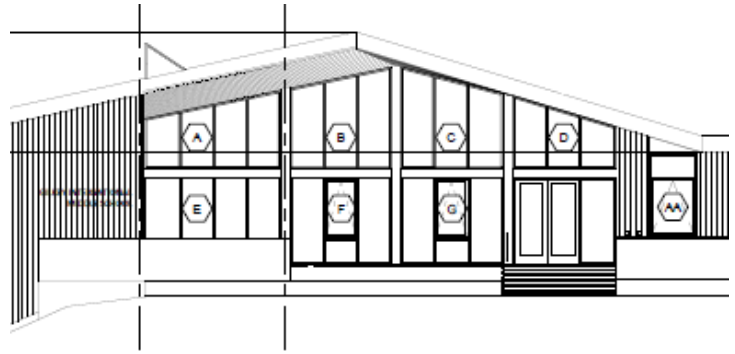
THERMAL SPACER FOR CLADDING SUPPORT SYSTEMS

INTRO TO CASCADIA WINDOWS & DOORS

WINDOW WALLS



WINDOWS & DOORS



STOREFRONT GLAZING

INTRO TO CASCADIA WINDOWS & DOORS

ABOUT THE COMPANY

- Manufacturing plant & head office located in Langley, BC
- Founded in 2008

PRIMARY MARKETS

- BC, Yukon, Washington, Oregon, California

COMPANY PURPOSE

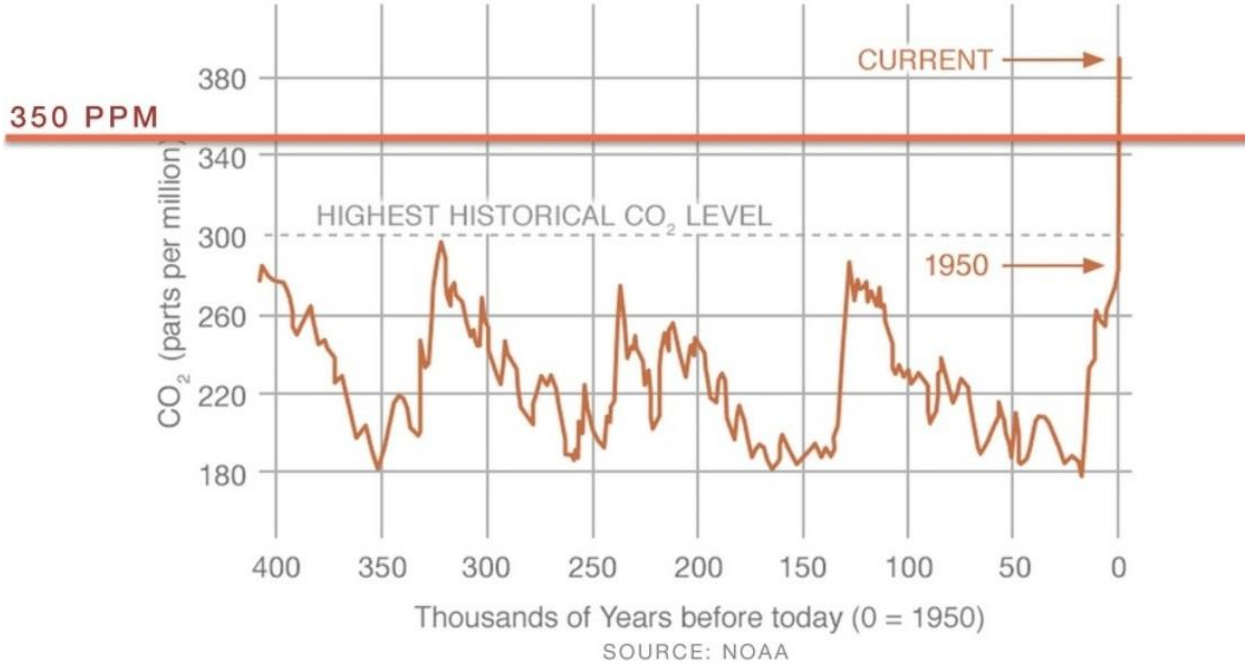
- To provide simple and cost-effective solutions to stringent energy code requirements

THE PROBLEM WITH BUILDINGS

Why are new Building Energy Performance Standards (BEPS) being introduced?

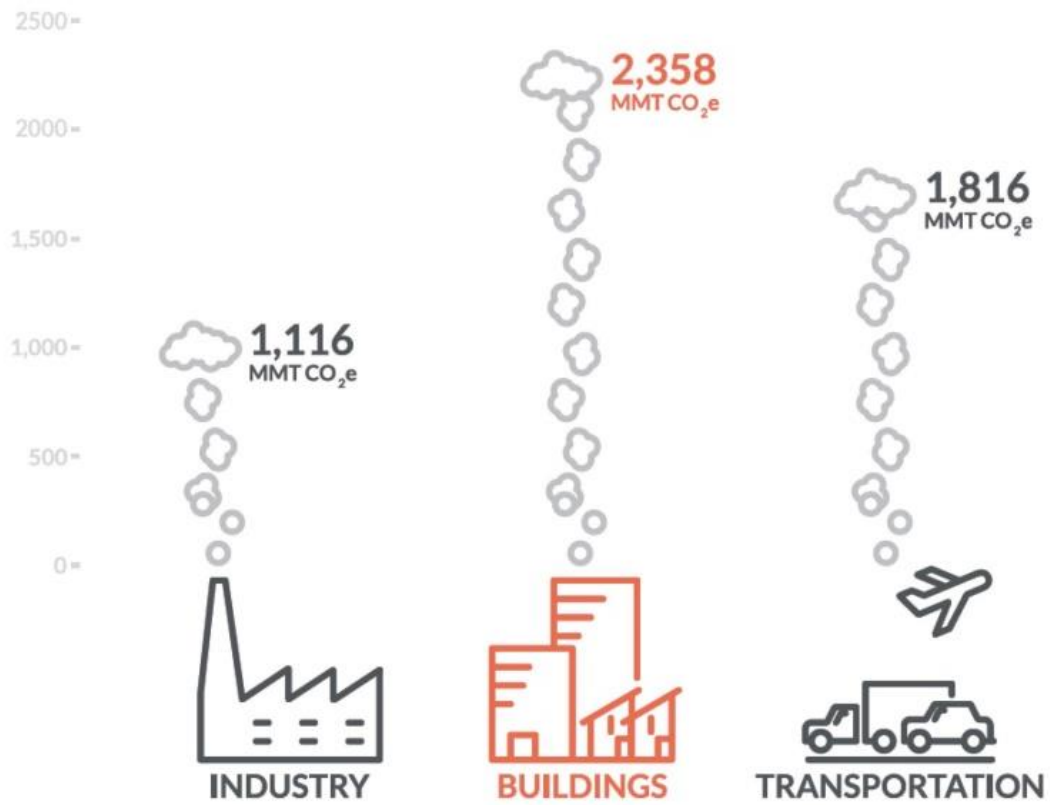
WHAT'S THE PROBLEM?

THE WORLD IS CHANGING. QUICKLY.



WHAT'S THE PROBLEM?

BUILDINGS ARE RESPONSIBLE FOR 44.5% OF US CO_2 EMISSIONS.



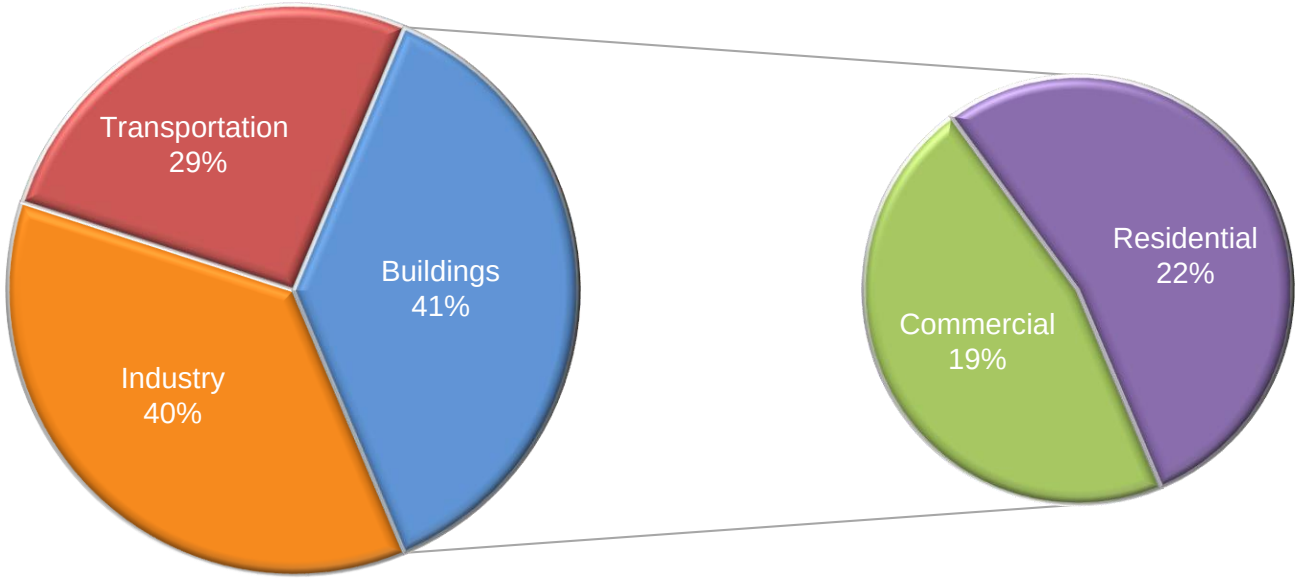
DATA SOURCE: ARCHITECTURE 2030
ILLUSTRATION: HAMMERANDHAND.COM

WHAT'S THE PROBLEM?

BUILDINGS ARE CONSUMING LARGE AMOUNTS OF ENERGY.

COMPARE TO CARS...

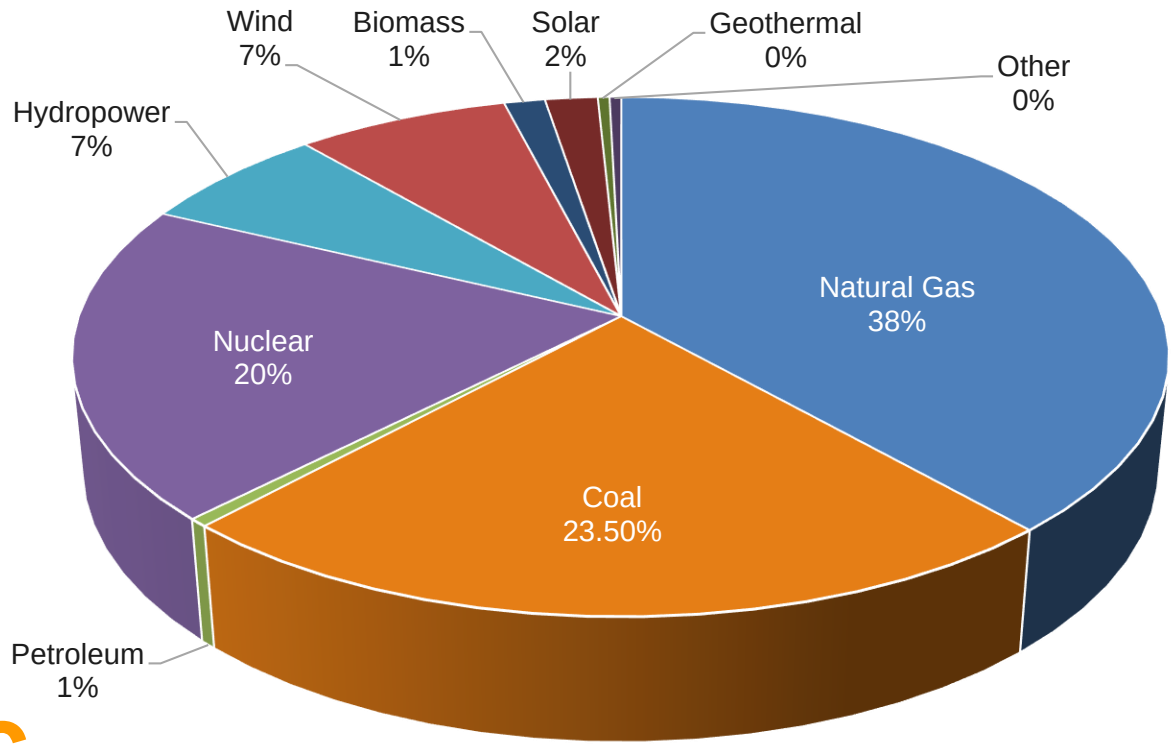
Buildings Share of U.S. Primary Energy Consumption (2011)



Source: "2011 Buildings Energy Data Book." U.S. Department of Energy (DOE).

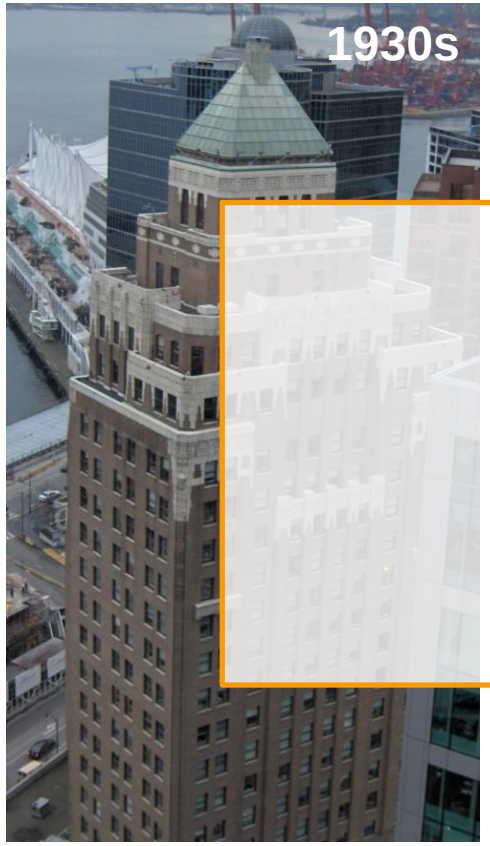
WHAT'S THE PROBLEM?

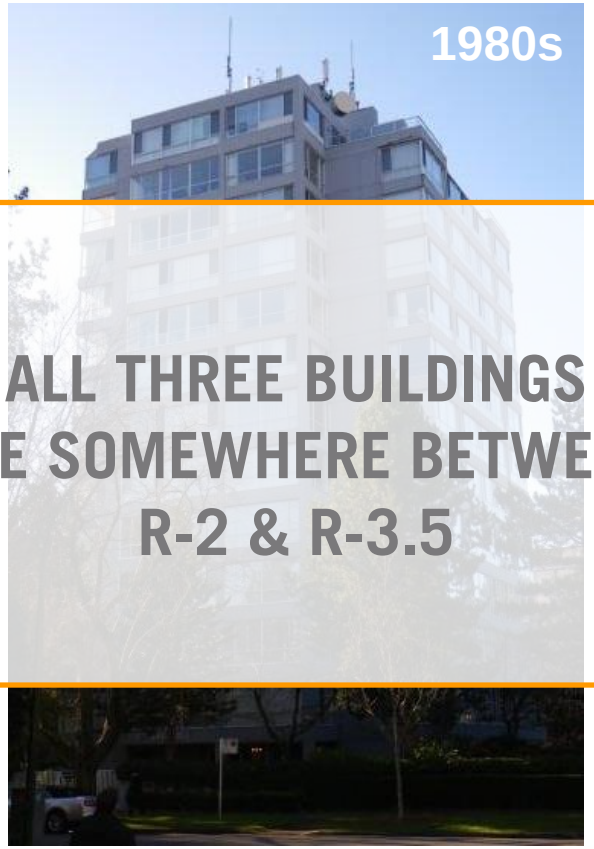
MUCH OF THE ENERGY CONSUMED IS FROM NON-RENEWABLE SOURCES.

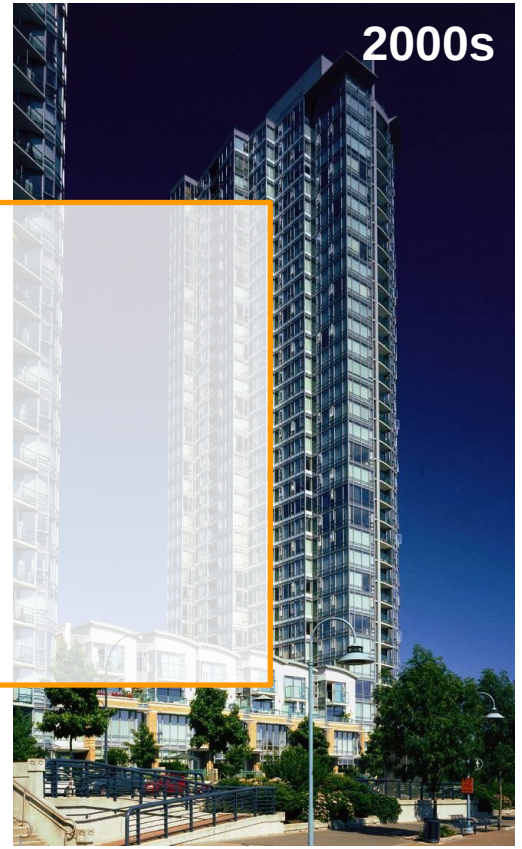


U.S. utility-scale electricity generation by source, amount, and share of total in 2019
U.S. Energy Information Administration

WHAT R THE NUMBERS?







ALL THREE BUILDINGS ARE SOMEWHERE BETWEEN R-2 & R-3.5

DICTATING BETTER PERFORMANCE

Seattle

ENERGY STEPCODE
BUILDING BEYOND THE STANDARD

NEW YORK STATE

CITY of BOSTON

NYC Buildings

TORONTO

CALIFORNIA ENERGY COMMISSION

ENERGY CONSERVATION IN BUILDINGS

REGULATORY CHANGES MUST BE BASED IN REALITY, SO

⇩

FIRST – YOU HAVE TO HAVE THE TECH

⇩

THEN – YOU CAN CHANGE THE LAWS TO REQUIRE HIGHER PERFORMANCE

⇩

NEW TECH *ENABLES* MORE STRINGENT REGULATIONS

ENERGY EFFICIENCY

New York City Set to Pass Ambitious Energy Efficiency Mandate

The city's biggest buildings would be forced to dramatically curb their carbon emissions by 2030 or face penalties under legislation heading for the mayor's desk.

JEFF ST. JOHN

APRIL 18, 2019

Buildings account for about 40 percent of U.S. energy consumption, according to the EIA.

THE TALE OF TWO CITIES

How do current BEPS differ from previous performance metrics?

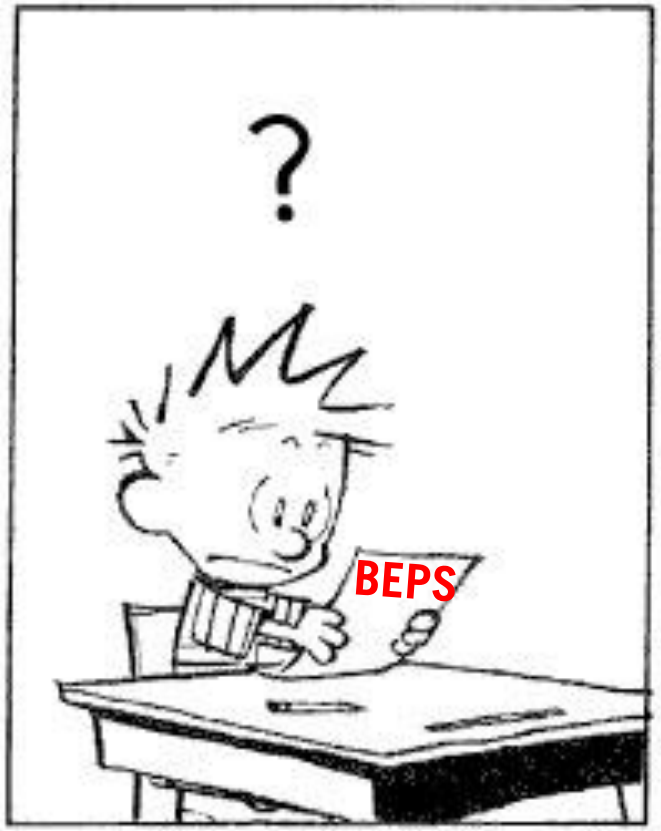
UNDERSTANDING TWO NEW CODES

Seattle

ENERGY STEPCODE
BUILDING BEYOND THE STANDARD

SCOPE OF OUR REVIEW

- There are limits to the depth of our review today
- I’m not suggesting that you will learn to be an energy modeller in the next 30 minutes
- Compliance with energy codes is achieved through multiple measures
- But every project starts somewhere
- We will explore what is the most efficient starting point to end up with energy code compliance



THESE CODE ARE DIFFERENT

PREVIOUS ENERGY CODES

SEPARATE ASSEMBLY R-VALUES

NOW (BC ENERGY STEP CODE EXAMPLE)

ONE ENERGY USE LIMIT

THESE CODES ARE DIFFERENT

- Where have we already seen a whole-building outcome-based target work?
- Passive House
- It is impossible to develop enough prescriptive detail to account for all influential factors (e.g. thermal bridging), while also being simple enough to actually follow and achieve
- Designing for results
- Flexibility and responsibility

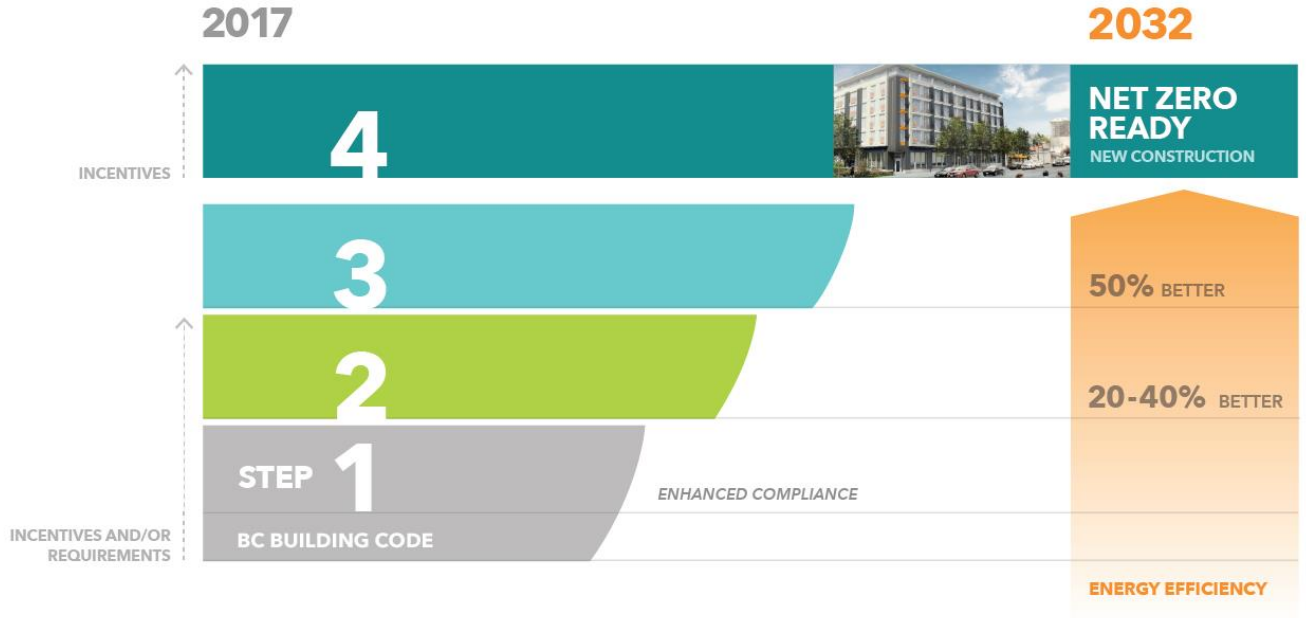
PHIUS
Passive House Institute US

Passive House Institute

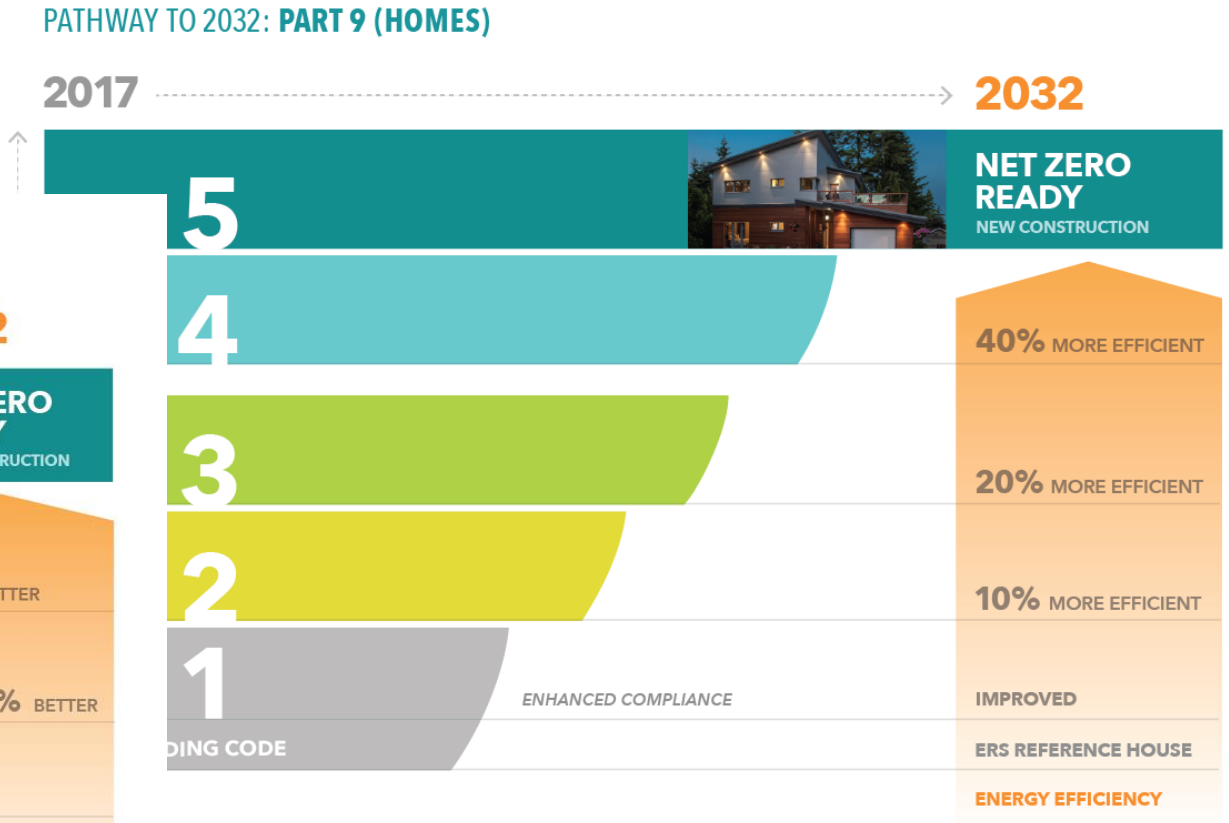
BC STEP CODES

- What are steps?

PATHWAY TO 2032: **PART 3 (WOOD-FRAME RESIDENTIAL)**

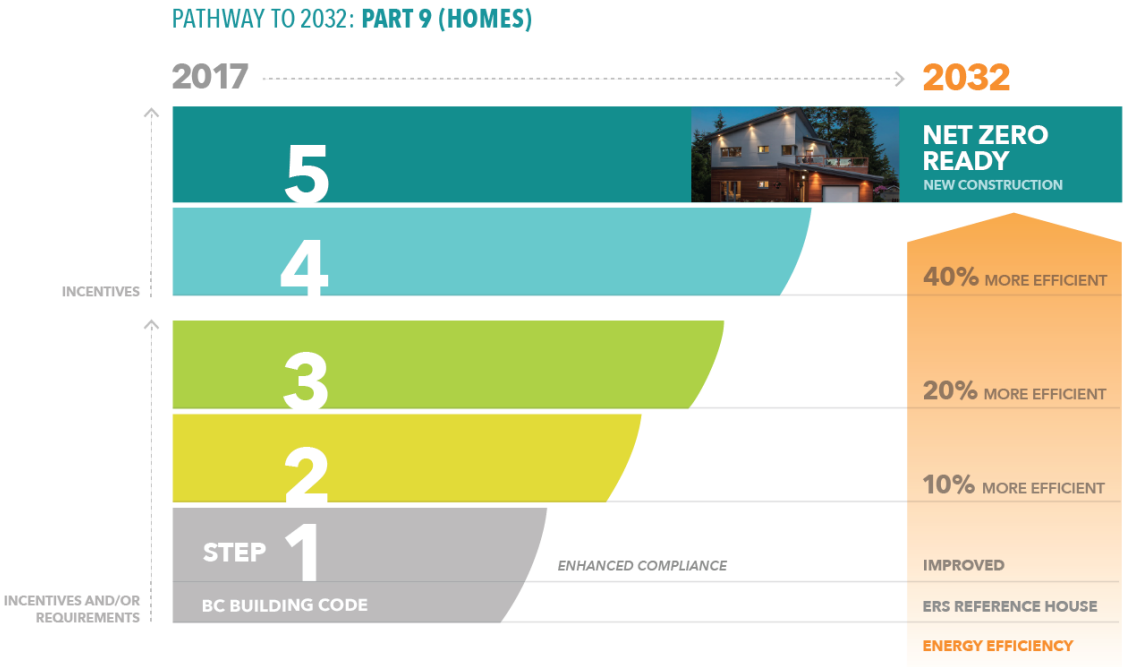


PATHWAY TO 2032: **PART 9 (HOMES)**



BC STEP CODES

- Steps = tighter limit on energy use per square-foot
- Creates continuity across the region – one energy code for BC, but…
- Also provides local flexibility – cities can choose any step (at, or above the current building code requirement) and may offer incentives on higher steps
- Cities just can't *modify* the steps



BC STEP CODES

- Value of knowing future targets for industry participants (manufacturers, builders, architects)
- Skip steps! ← This opportunity is really important
- Save money: re-tool or re-train just once or twice; not five times
- To be clear, <u>we will be building Net-Zero-Ready</u> construction in 12 years or less, as a built-to-minimum-code building
- You might as well get used to the necessary tech and methods before it's the legal minimum

2018 SEATTLE CODE UPDATE

- Still has multiple compliance paths, including a prescriptive path and total building performance path (a trade-off path)
- And a newly-introduced outcome-based energy budget compliance path
- Also has future targets
    - 2018 (the “now” for this code) and
    - four future increments – out to 2030

2018 SEATTLE CODE UPDATE

- Building enclosure in the total-building-performance (trade-off) path
- Uses math to compare design to a prescriptive building
- Washington (except Seattle) – your envelope can be 20% worse than the prescriptive model
- THE PRESCRIPTIVE MODEL DOES NOT ADDRESS THERMAL LOSSES BETWEEN ASSEMBLIES
- Seattle – you cannot use energy modelling to make your envelope any worse than the prescriptive model

2018 SEATTLE CODE UPDATE

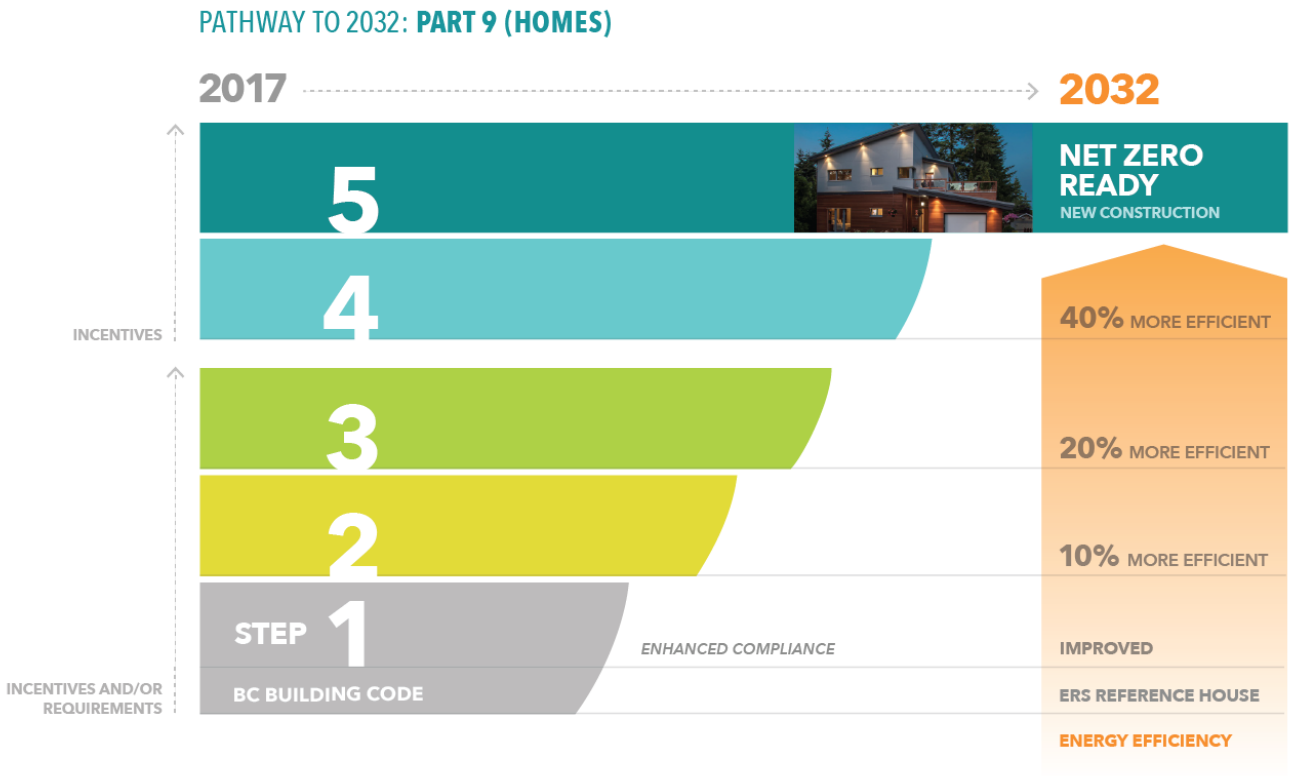
- Why model?
    - Increase glazing area
- Prescriptive limit is 30%
    - some conditions permit up to 40% with improved windows and/or daylighting
- Energy modelling permits variable glazing percentage

2018 SEATTLE CODE UPDATE

- The modeled comparison to a prescriptive building has relaxations for certain fenestration types:
    - Curtain wall
    - Storefront
    - Any AW-class window
- If AW-class windows are used (of any frame type), your model's prescriptive building can use the relaxed fenestration U-value, thus increasing the beneficial difference that better U-value fenestration brings to your calculation
- Find some AW-class high-performance windows, and your model becomes *very* flexible

Location	U-value for windows	U-value for curtain wall, storefront and AW-class windows
Washington state	U-0.30	U-0.38
Seattle	U-0.26	U-0.30

ENERGY CODES NEED COMPONENTS



(LEFT) GOVERNMENT OF BRITISH COLUMBIA

TARGETING THE WEAKEST LINK

Exploring design flexibility offered under BEPS

DESIGN FLEXIBILITY

- Flexibility
- Responsibility
- Start with getting the building enclosure performing well
- Everything else is so much easier after that
- “Easier” = less cost and more options

IMPACT OF WINDOWS ON BUILDING PERFORMANCE

PROJECT EXAMPLE

- Mid-rise, MURB rehabilitation
- Window-to-wall ratio of roughly 2:1
- Overall building energy performance target of > R-8

Jervis Street
Vancouver, BC

RUNNING PERFORMANCE NUMBERS

ASSEMBLIES	R-Value (effective)	Area (%)
Walls		
Windows		

ADD NEW ROW +

Results			
	area total -->	0.00	
	Total U-value:	**0.00** (imp)	**0.00** (metric)
	Total R-value:	**Infinity** (imp)	**Infinity** (metric)

DESIGN FLEXIBILITY

- Exterior insulation – yes or no?
- Mechanical system size; type
- A bigger home?
- Glazing area – more?

GLAZING AREA - MORE

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 35 kWh/m2
TEUI - 111 kWh/m2

WHAT DOES INCREASED GLAZING AREA LOOK LIKE?

GLAZING AREA - MORE

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 35 kWh/m2
TEUI - 111 kWh/m2

FIBERGLASS WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 30 kWh/m2
TEUI - 106 kWh/m2

GLAZING AREA - MORE

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 35 kWh/m2
TEUI - 111 kWh/m2

FIBERGLASS WINDOW WALL

45%

WINDOW-TO-WALL RATIO

TEDI - 30 kWh/m2
TEUI - 107 kWh/m2

GLAZING AREA - MORE

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 35 kWh/m2
TEUI - 111 kWh/m2

FIBERGLASS WINDOW WALL

50%

WINDOW-TO-WALL RATIO

TEDI - 30 kWh/m2
TEUI - 107 kWh/m2

GLAZING AREA - MORE

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 35 kWh/m2
TEUI - 111 kWh/m2

FIBERGLASS WINDOW WALL

55%

WINDOW-TO-WALL RATIO

TEDI - 30 kWh/m2
TEUI – 107 kWh/m2

GLAZING AREA - MORE

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 35 kWh/m2
TEUI - 111 kWh/m2

FIBERGLASS WINDOW WALL

60%

WINDOW-TO-WALL RATIO

TEDI - 30 kWh/m2
TEUI - 108 kWh/m2

GLAZING AREA - MORE

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 35 kWh/m2
TEUI - 111 kWh/m2

FIBERGLASS WINDOW WALL

65%

WINDOW-TO-WALL RATIO

TEDI - 30 kWh/m2
TEUI - 109 kWh/m2

GLAZING AREA - MORE

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 36 kWh/m2
TEUI - 125 kWh/m2

FIBERGLASS WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 32 kWh/m2
TEUI - 121 kWh/m2

GLAZING AREA - MORE

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 36 kWh/m2
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FIBERGLASS WINDOW WALL

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GLAZING AREA - MORE

ALUMINUM WINDOW WALL

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WINDOW-TO-WALL RATIO

TEDI - 36 kWh/m2
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FIBERGLASS WINDOW WALL

50%

WINDOW-TO-WALL RATIO

TEDI - 32 kWh/m2
TEUI - 124 kWh/m2

GLAZING AREA - MORE

ALUMINUM WINDOW WALL

40%

WINDOW-TO-WALL RATIO

TEDI - 36 kWh/m2
TEUI - 125 kWh/m2

FIBERGLASS WINDOW WALL

55%

WINDOW-TO-WALL RATIO

TEDI - 32 kWh/m2
TEUI - 125 kWh/m2

UNDERSTANDING MODERN WINDOWS

Intro to high-performance fenestration options

TYPICAL WINDOW FRAMES

WOOD FRAME

PHOTO CREDIT: NEUFFER WINDOWS

VINYL / UPVC

PHOTO CREDIT: EUROLINE WINDOWS

FIBERGLASS

PHOTO CREDIT: CASCADIA WINDOWS & DOORS

ALUMINUM

PHOTO CREDIT: GLO EUROPEAN WINDOWS

TYPICAL APPLICATIONS

WOOD FRAME

RESIDENTIAL

PHOTO CREDIT: NEUFFER WINDOWS

VINYL / UPVC

RESIDENTIAL
MULTI-FAMILY

PHOTO CREDIT: EUROLINE WINDOWS

FIBERGLASS

RESIDENTIAL
MULTI-FAMILY
COMMERCIAL
HIGH-RISE

PHOTO CREDIT: CASCADIA WINDOWS & DOORS

ALUMINUM

MULTI-FAMILY
COMMERCIAL
HIGH-RISE

PHOTO CREDIT: GLO EUROPEAN WINDOWS

TYPICAL APPLICATIONS

WOOD FRAME

PHOTO CREDIT: NEUFFER WINDOWS

VINYL / UPVC

PHOTO CREDIT: EUROLINE WINDOWS

FIBERGLASS

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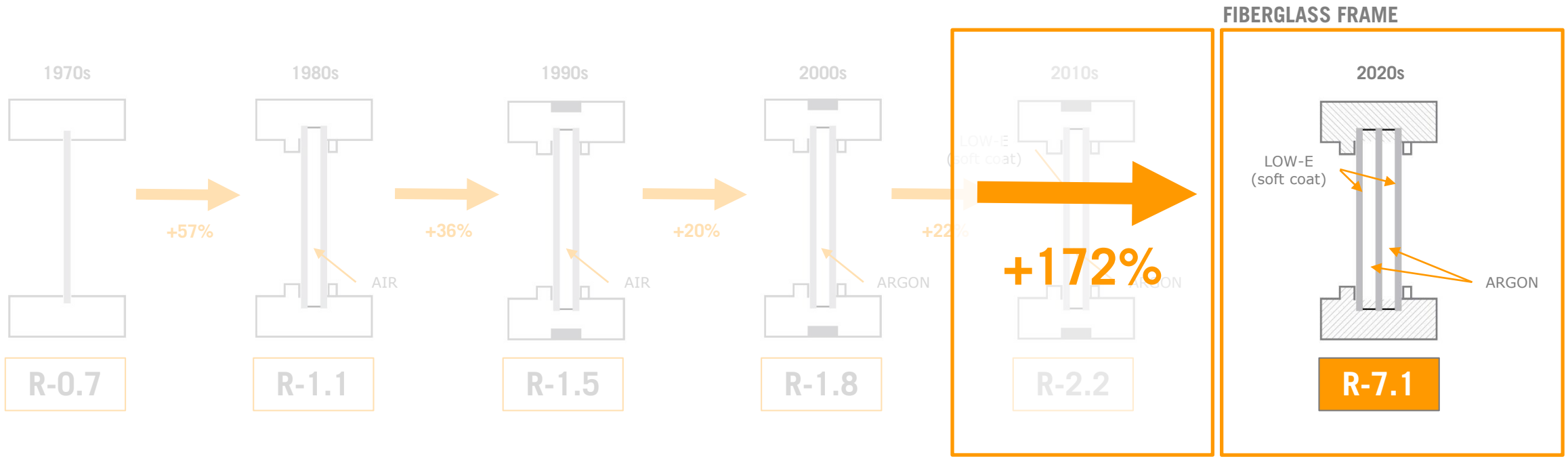
PHOTO CREDIT: CASCADIA WINDOWS & DOORS

ALUMINUM

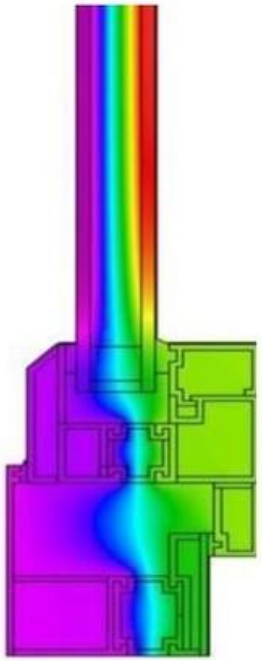
MULTI-FAMILY
COMMERCIAL
HIGH-RISE

PHOTO CREDIT: GLO EUROPEAN WINDOWS

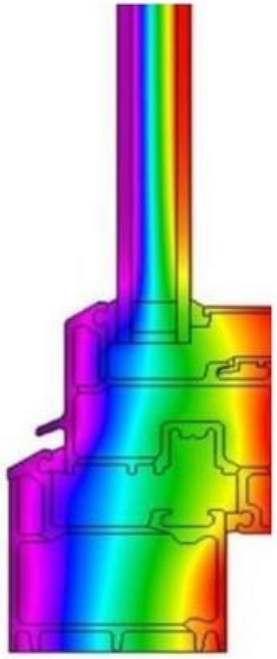
A HISTORY OF WINDOW PERFORMANCE



THERMAL PERFORMANCE



THERMALLY BROKEN ALUMINUM FRAME



FIBERGLASS FRAME

THERMAL PERFORMANCE

Typical Thermally Broken Aluminum Frame

Standard IGU:
- Low-E
- Argon fill
- Stainless steel spacers

R VALUE: 2.0

Typical Fiberglass Frame

Standard IGU:
- Low-E
- Argon fill
- Stainless steel spacers

R VALUE: 3.7

85% IMPROVEMENT

REDUCED HEAT LOSS THROUGH WINDOWS

USING ACTUAL NFRC CERTIFIED U-VALUES FROM WINDOW FABRICATORS

THERMAL PERFORMANCE

CASCADIA EXAMPLES

R-4.1

Double Glazing

OVER 100% IMPROVEMENT

R-7.1

Triple Glazing

OVER 250% IMPROVEMENT

THERMAL PERFORMANCE

30-50%

of a building's heating & cooling energy is lost through windows

20-30%

of a typical window areas is represented by the window frame

BY IMPROVING THE FRAME, YOU IMPROVE THE OVERALL PERFORMANCE OF THE ENTIRE WINDOW

Broeckx-Smith, S., Suh, S., 2019

HIGH-PERFORMANCE, COST-NEUTRAL

Cost-optimizing high-performance fenestration options

HIGH-PERFORMANCE

R-4.1
DOUBLE GLAZING

R-7.1
STANDARD TRIPLE GLAZING

R-7.7
PREMIUM TRIPLE GLAZING

SPANDREL -
METAL BACKPAN (STANDARD)
4" INSULATION

R-16.2

SPANDREL -
METAL BACKPAN (PREMIUM) -
5" INSULATION

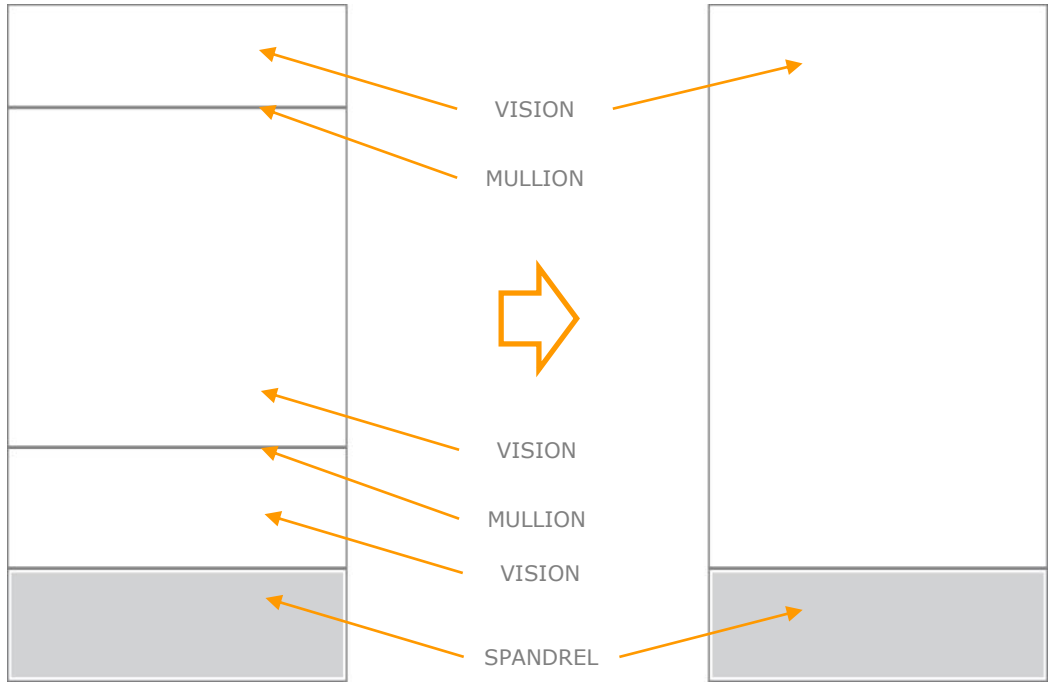
R-19.1

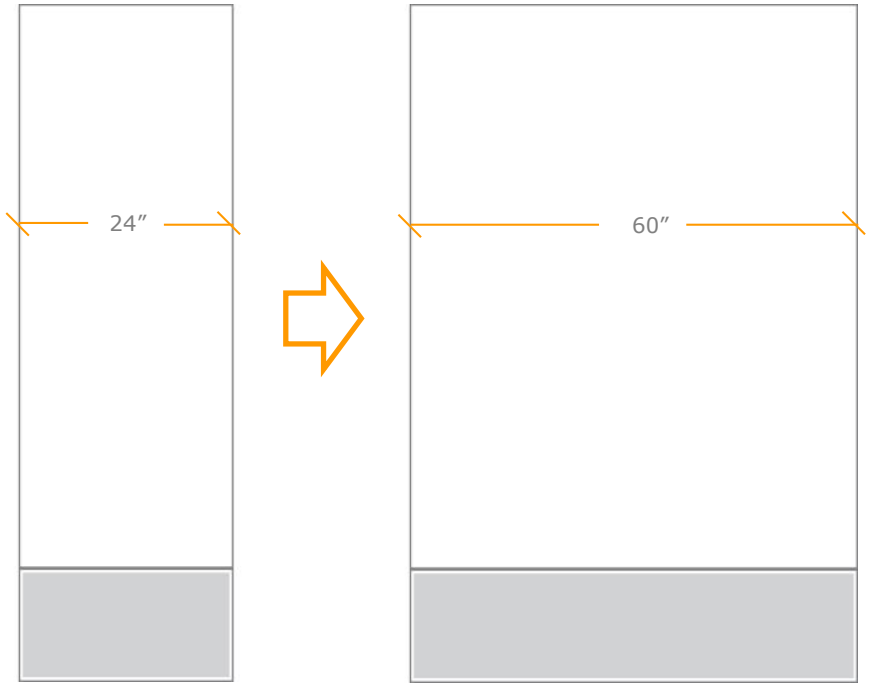
SLAB BYPASS -
STANDARD

R-8.1

FOR HIGH-PERFORMANCE WINDOWS

Cost savings options when designing window configurations?





KEY TAKE-AWAYS

BC ENERGY STEP CODE & SEATTLE CODE UPDATE-2018 INVOLVES A WHOLE BUILDING APPROACH: ONE ENERGY USE LIMIT

THE PASSIVE ELEMENTS OF THE BUILDING ENCLOSURE OFFER THE MOST SIGNIFICANT OPPORTUNITY FOR COMPLIANCE

IMPROVE THE WEAKEST R-VALUE COMPONENTS TO MAKE THE BIGGEST WHOLE-BUILDING GAIN

2018 CaGBC GREEN BUILDING PRODUCT OF THE YEAR

cool, temperate climate

phB

CERTIFIED COMPONENT

Passive House Institute

ABOUT CASCADIA WINDOWS & DOORS

OUR PRODUCTS

FIBERGLASS
PUNCH WINDOWS & DOORS

OUR PRODUCTS

FIBERGLASS STRIP WINDOWS

OUR PRODUCTS

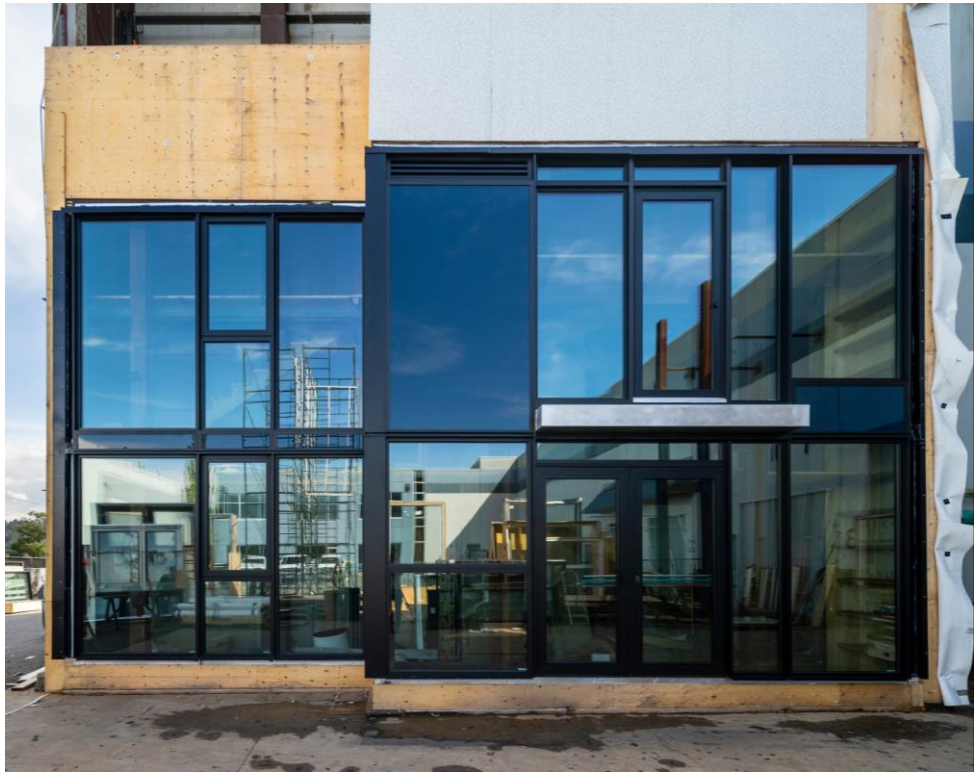
FIBERGLASS STOREFRONT GLAZING

OUR PRODUCTS

FIBERGLASS STOREFRONT DOORS

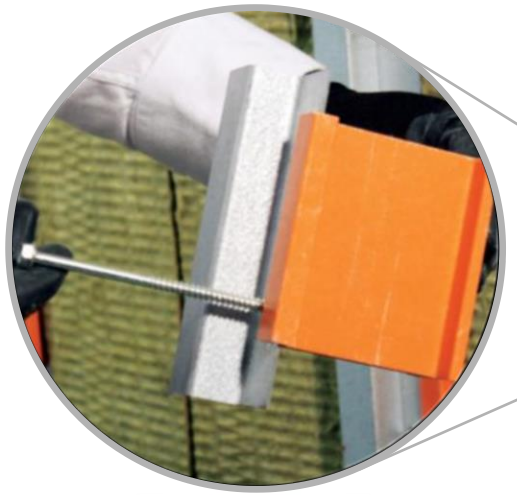
OUR PRODUCTS

FIBERGLASS WINDOW WALL



OUR PRODUCTS

FIBERGLASS THERMAL SPACER – CASCADIA CLIP®

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