

*Driving ZNE to scale through policy, codes and programs:
Focusing on states and regions*

Policy innovation in British Columbia: Energy step code, zero carbon buildings and the Passive House explosion

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@tompierrefs

Getting to Zero National Forum
Denver, Colorado
October 14, 2016

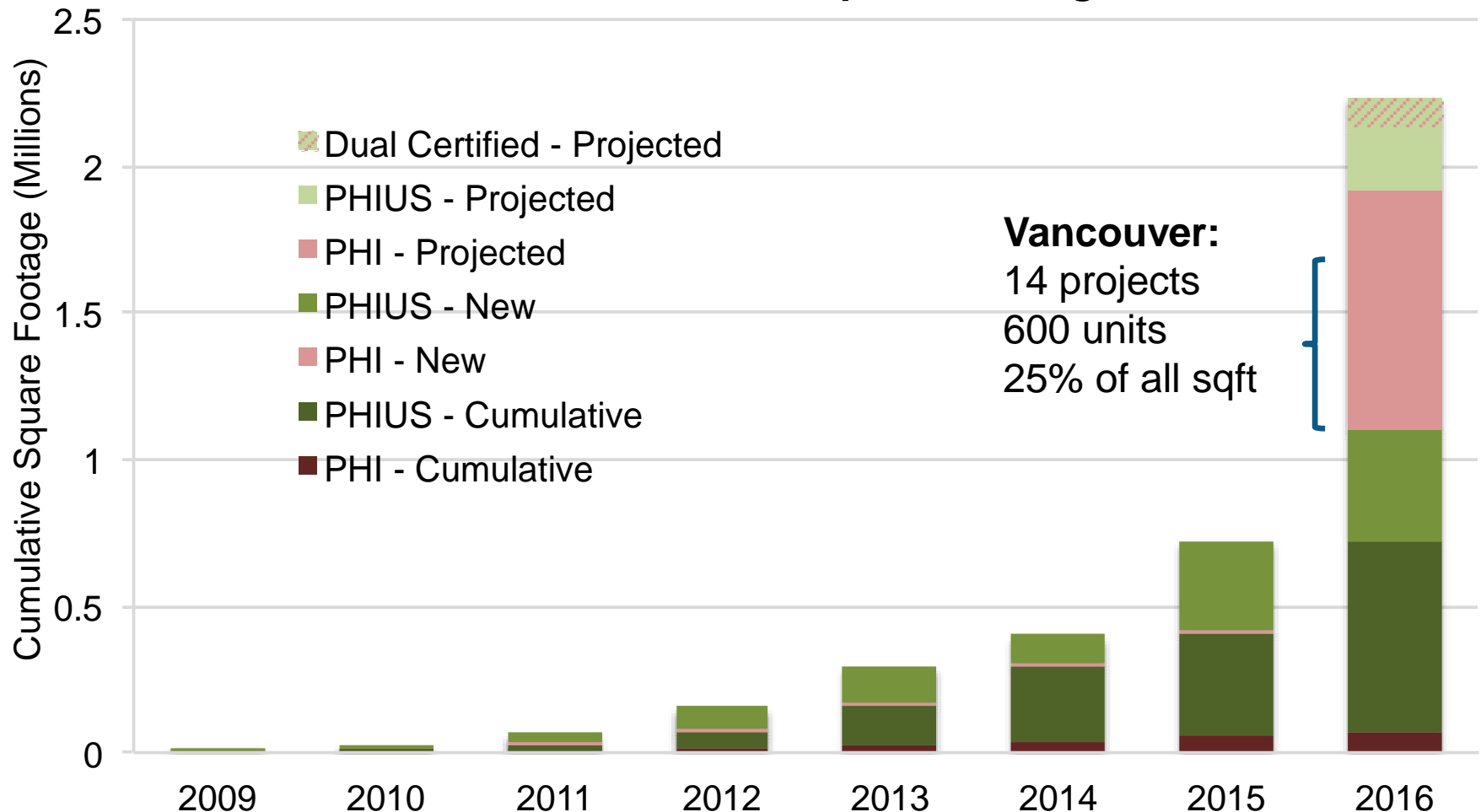
Leading Canada's transition to a clean energy future

The Pembina Institute advocates for strong, effective policies to support Canada's clean energy transition.



Growth of Passive House in North America

Cumulative Square Footage





Outline

1. How did it come to be? Supporting policies in Vancouver
2. Where to next? Vancouver's Zero Emissions Building Plan
3. Scaling up: British Columbia Energy Step Code and NZEr target

Passive House enabling policies in Vancouver

- Green rezoning for increased density
 - Affects 60% of new development (2.6 million sf/yr)
 - Requires LEED Gold and 22% below ASHRAE 90.1 OR Passive House
- Thick wall exclusion and setback allowance
- Training of permitting staff and inspectors; staff support

Lessons learned: use metrics aligned with desired outcome

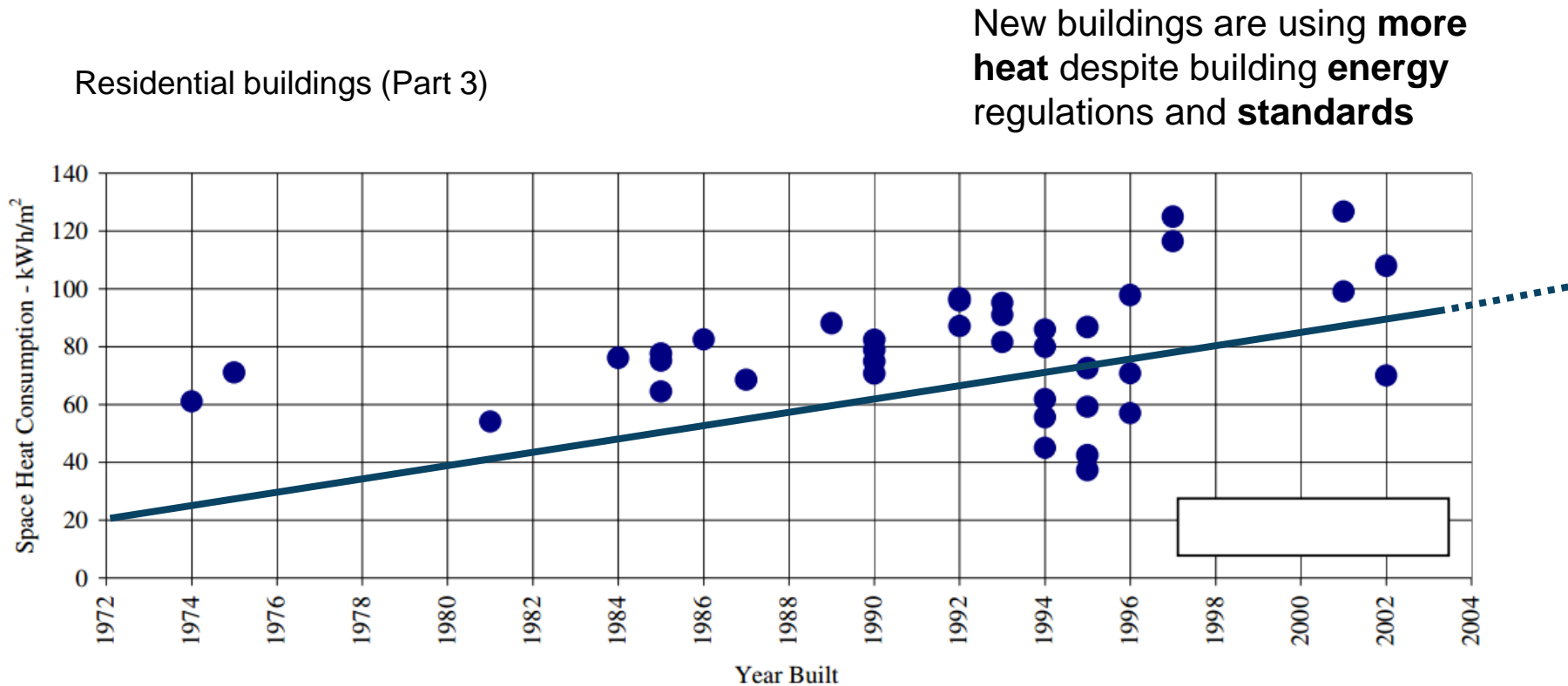


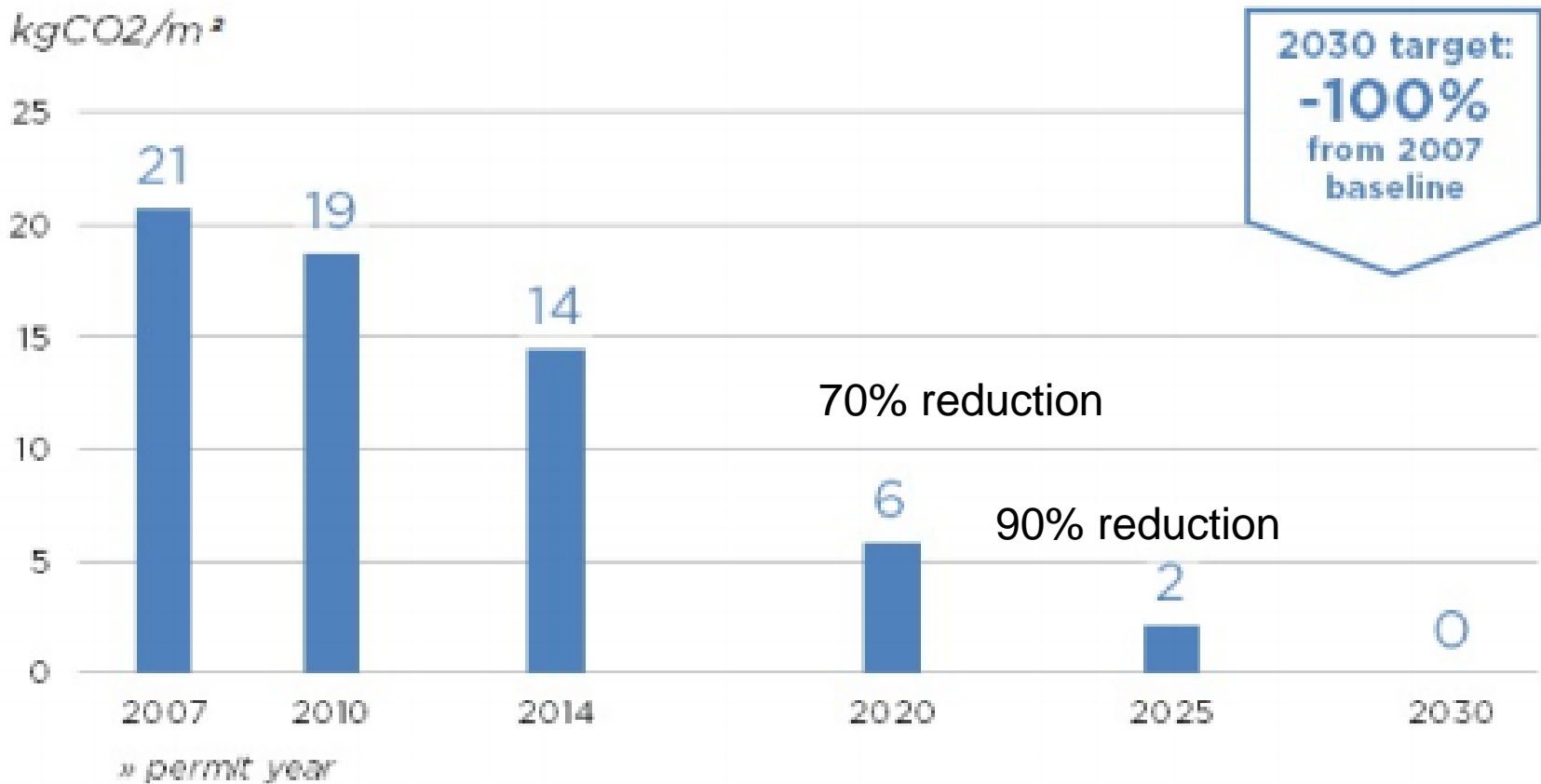
Fig. 3.1.5 Space Heat Intensity versus Year of Construction – Consumption in kWh/m².





Vancouver Zero Emissions Buildings Plan

Annual GHG Emissions of New Buildings



Vancouver Zero Emissions Buildings Plan



2016: 50-64% GHG reduction
2020: passive house performance*
2025: zero carbon
(for rezoning)



2016: 60% GHG reduction
2020: near passive house performance
2025: zero carbon
(for rezoning)



2014: 50% reduction in GHG intensity
2020: 70% reduction in GHG intensity
2025: zero carbon, thermal load $< 30 \text{ kWh/m}^2/\text{yr}$
(9.5 KBTU/sf)

* i.e. Thermal load intensity $< 15 \text{ kWh/m}^2$ (4.7 KBTU/sf)

B.C. Energy Step Code

Problem

- Local climate leadership led to patchwork of green building policies

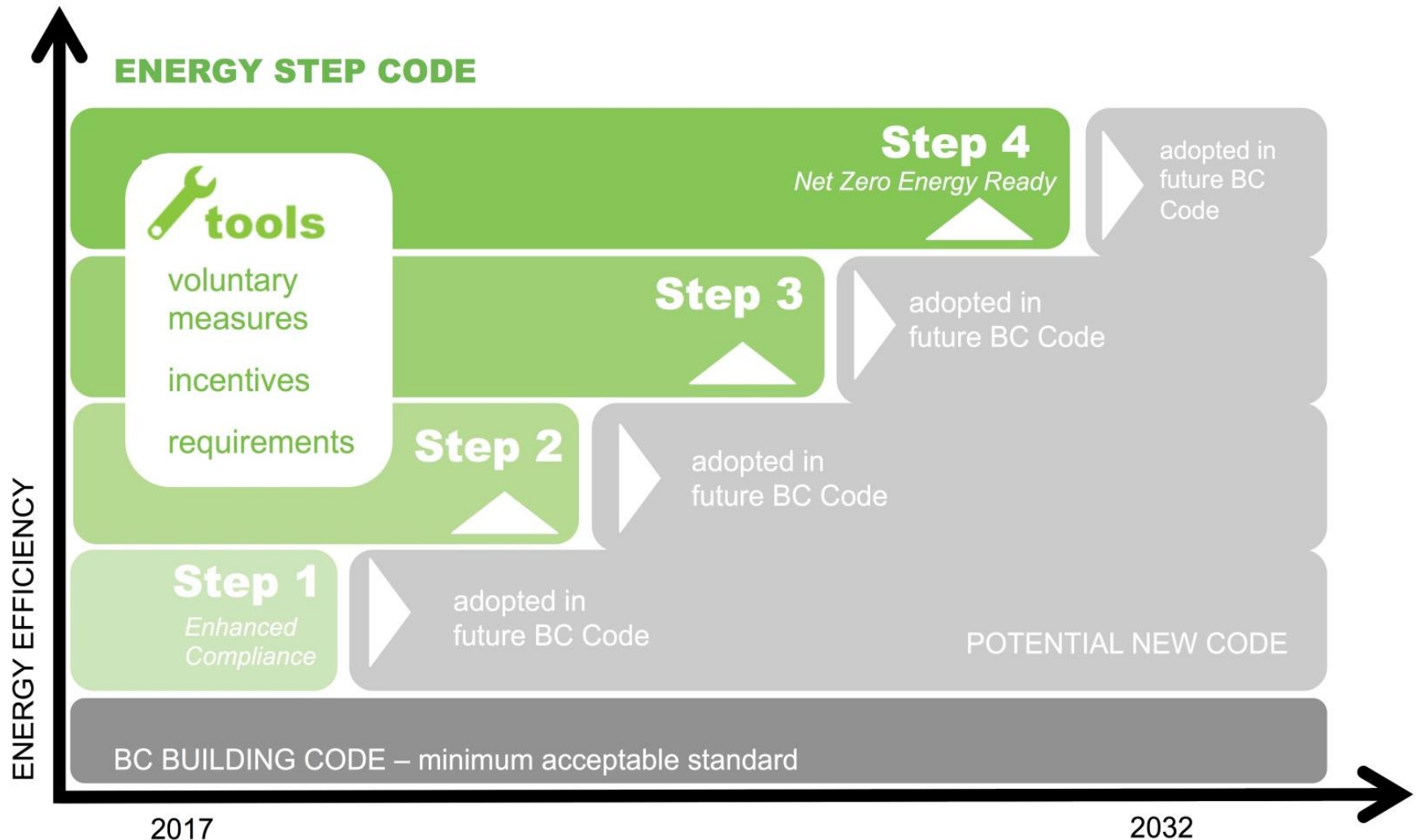
Solution

- Provincially-designed opt-in energy performance requirements

Principles

- Implementation through partnerships
- “Envelope first” approach
- Measure performance
- Framework valid for next 10+ years

B.C. Energy Step Code



Collaborative design



But how does that relate to base code evolution?...

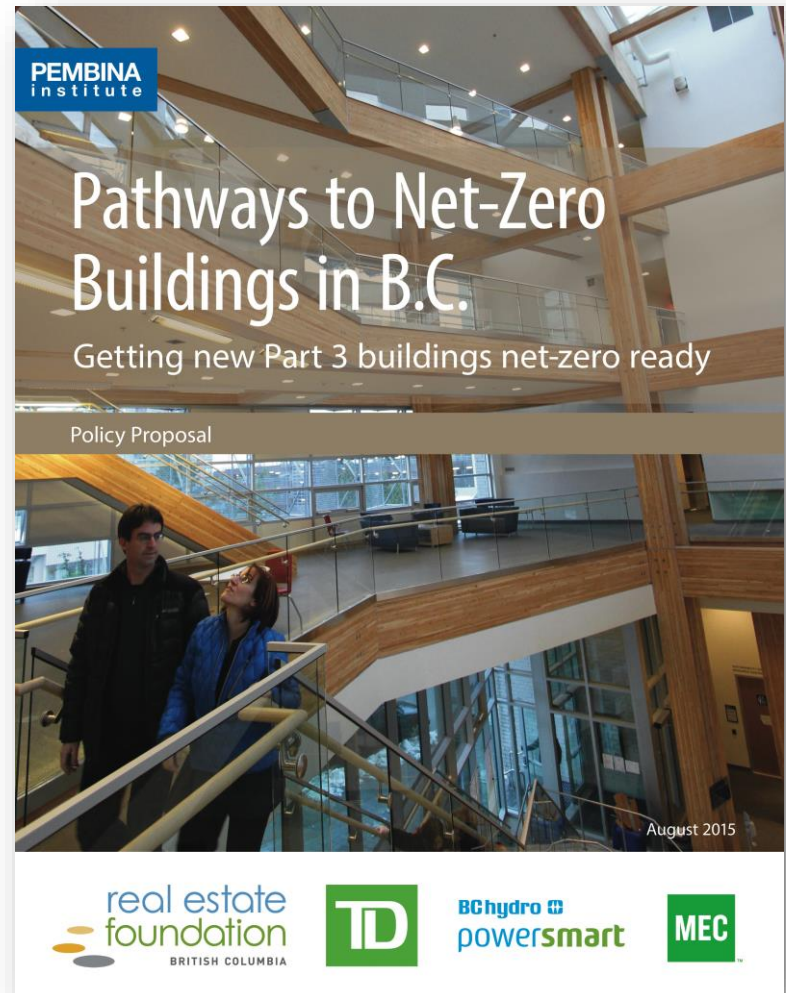
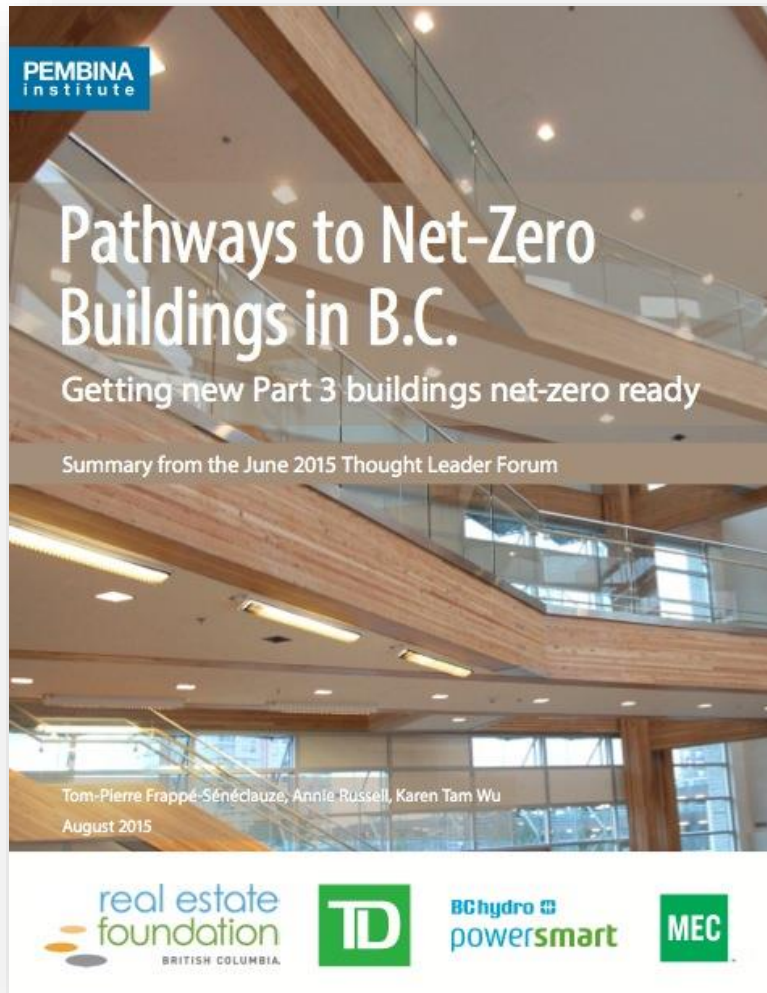
Thought Leader Forum, June 2015

2 days, 50 organizations, 82 participants:

Can we get new buildings 'net-zero ready' by 2030?



Summary and policy proposal



pembina.org/reports/pathways-to-net-zero-summary.pdf

Call to Action on Climate and Energy in the Building Sector



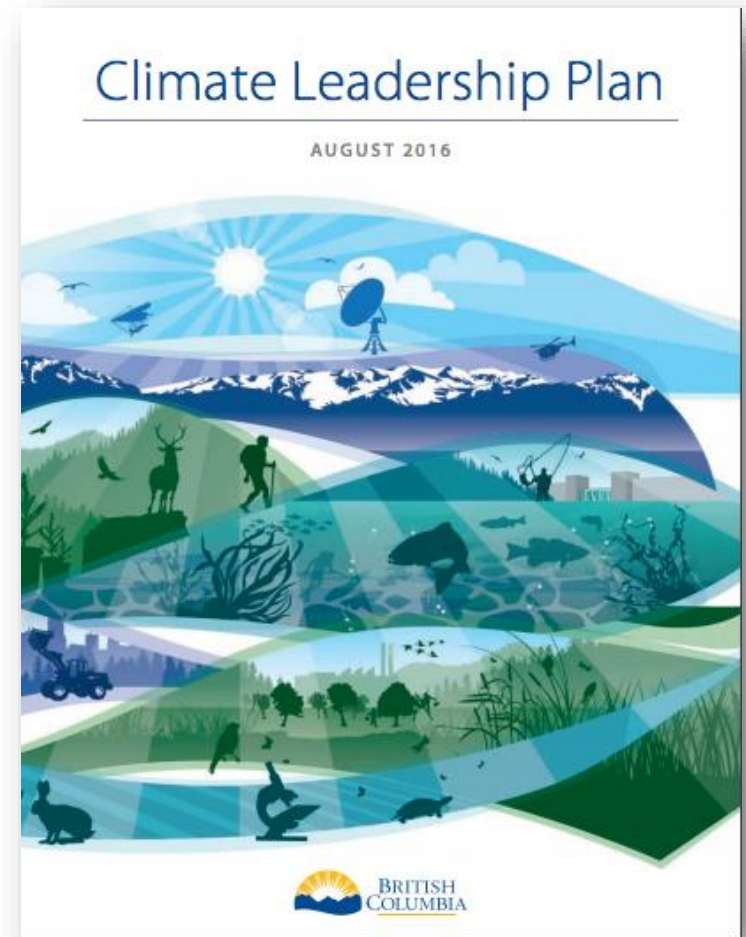
A subset of the 100+ signatories: local governments, organizations, businesses, etc.

B.C.'s new Climate Plan

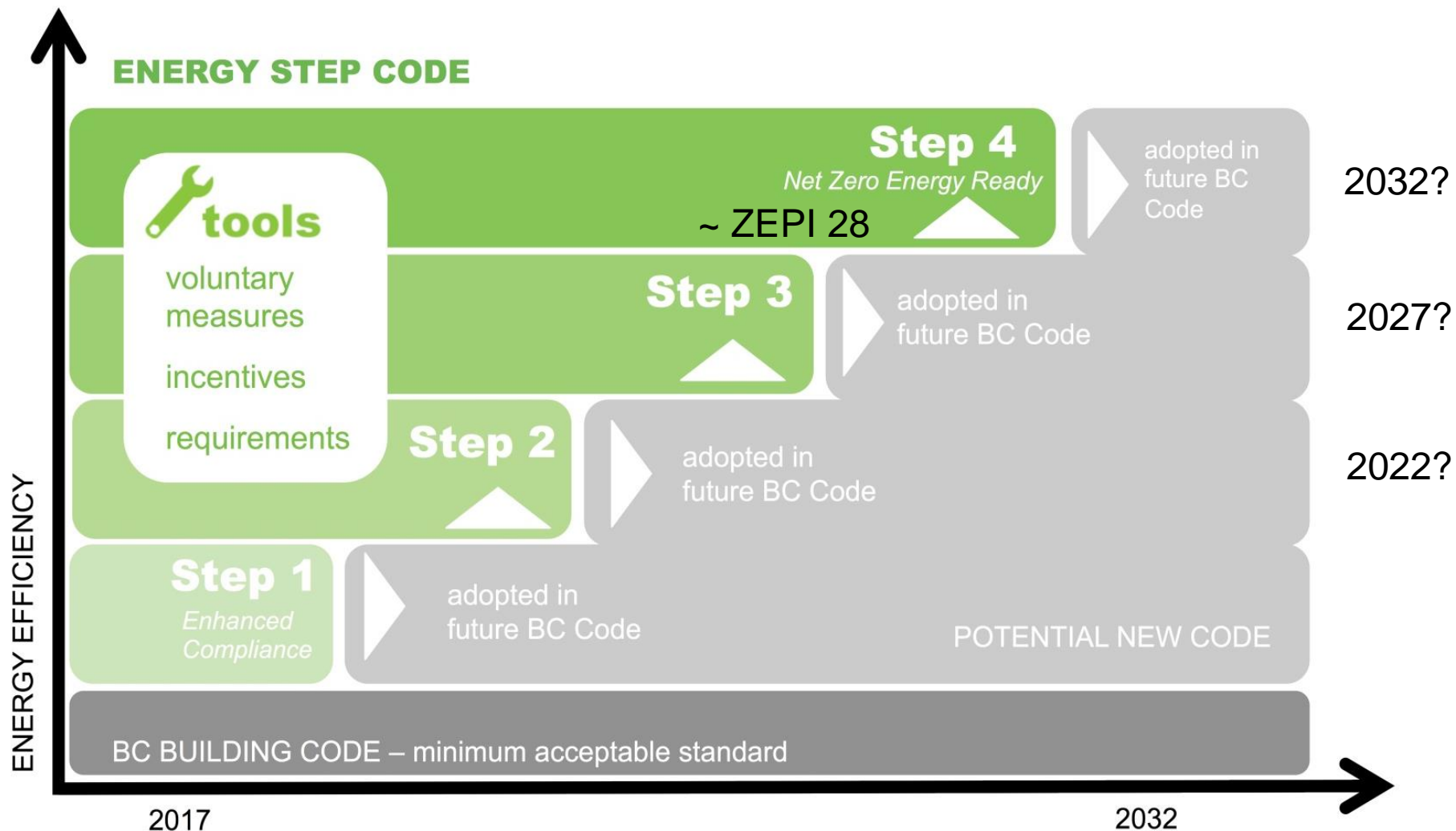
Code to require Net Zero
Ready by 2032

Incentive program for high
performance buildings

... but nothing on existing
buildings.



B.C. Energy Step Code



Pathways to
**NET-ZERO
BUILDINGS**

Thought Leader Forum | Accelerating deep retrofits

November 28-29, 2016 | Vancouver | pembina.org/netzeroforum

#NetZeroForum

Thanks!

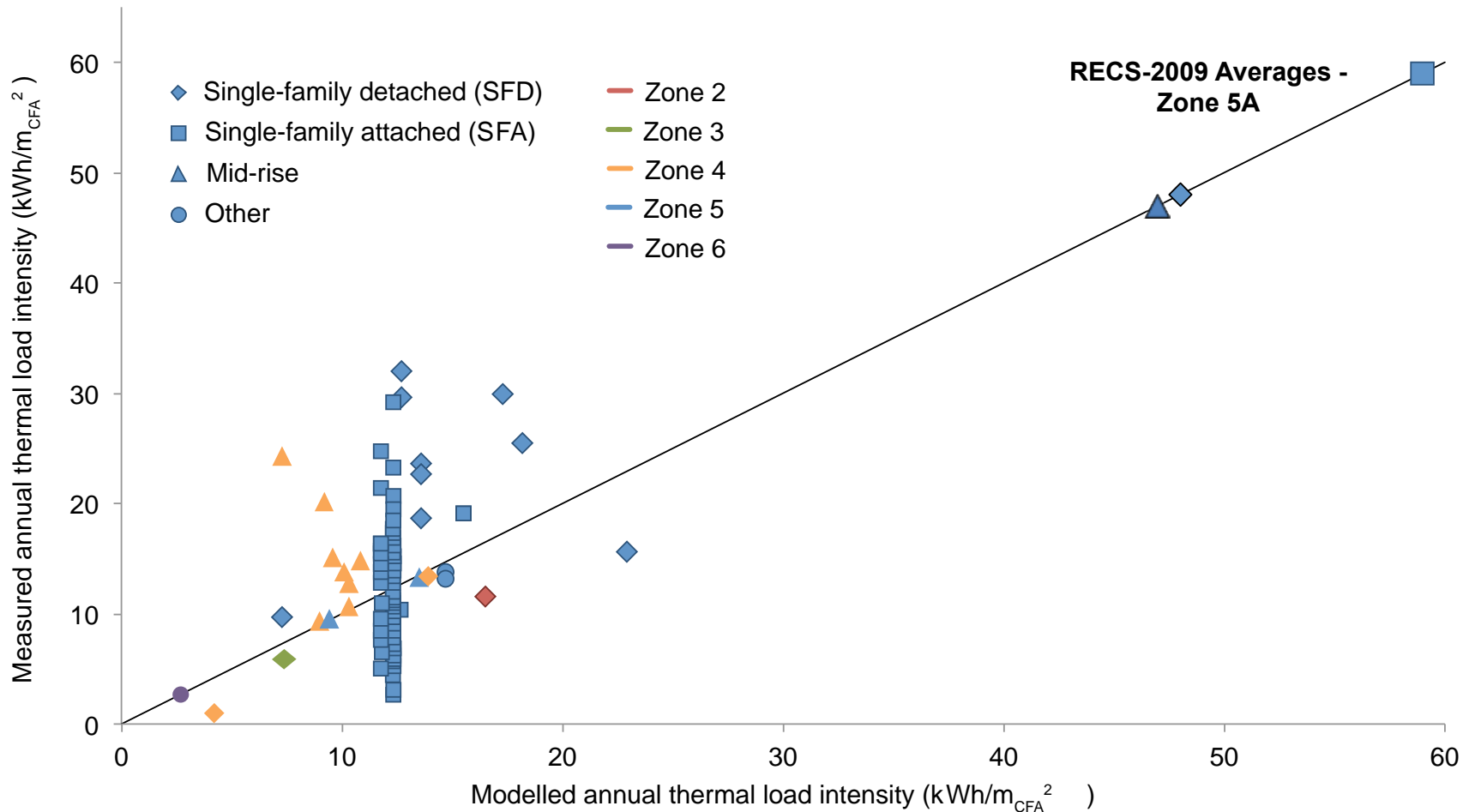
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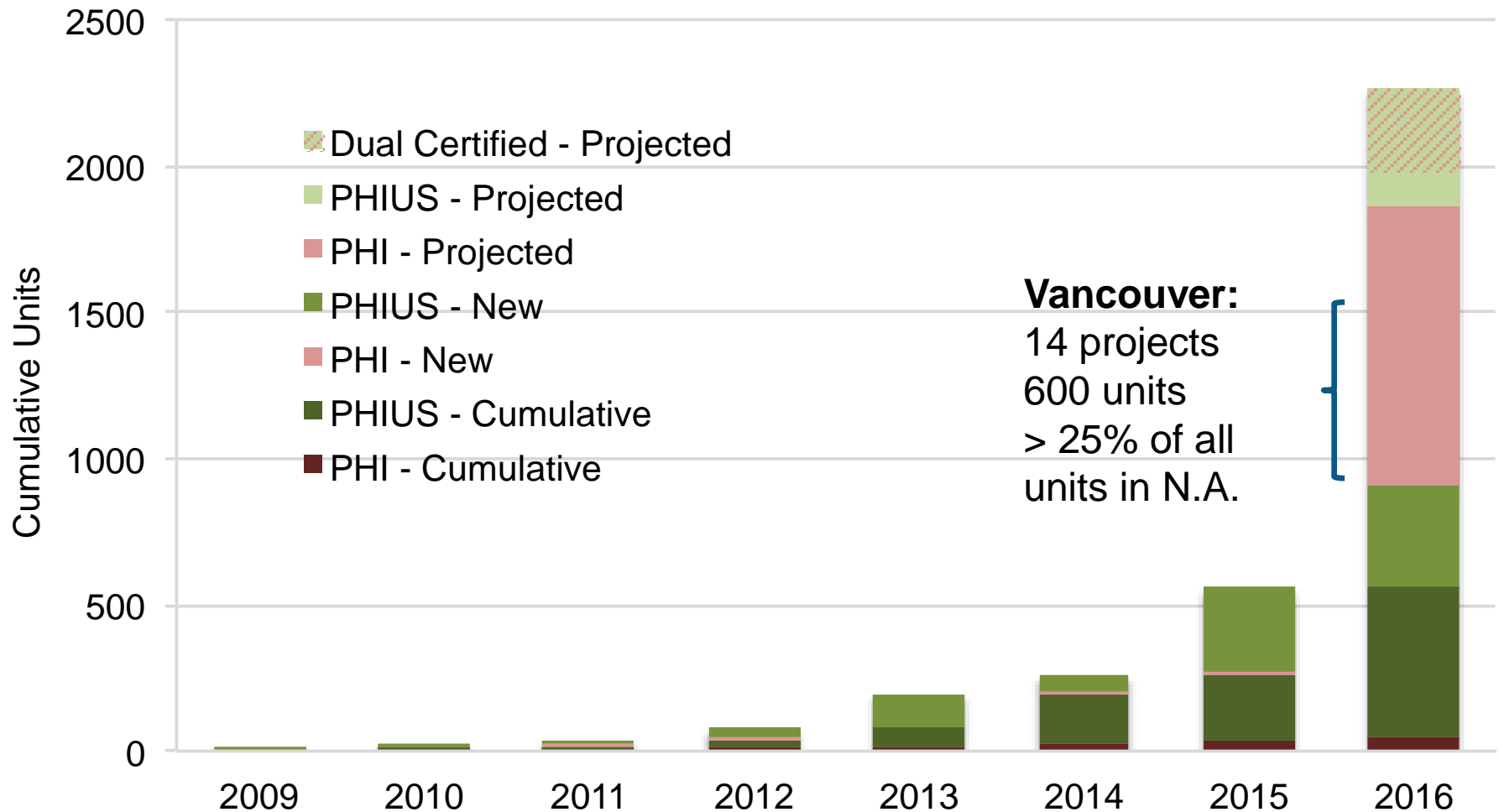
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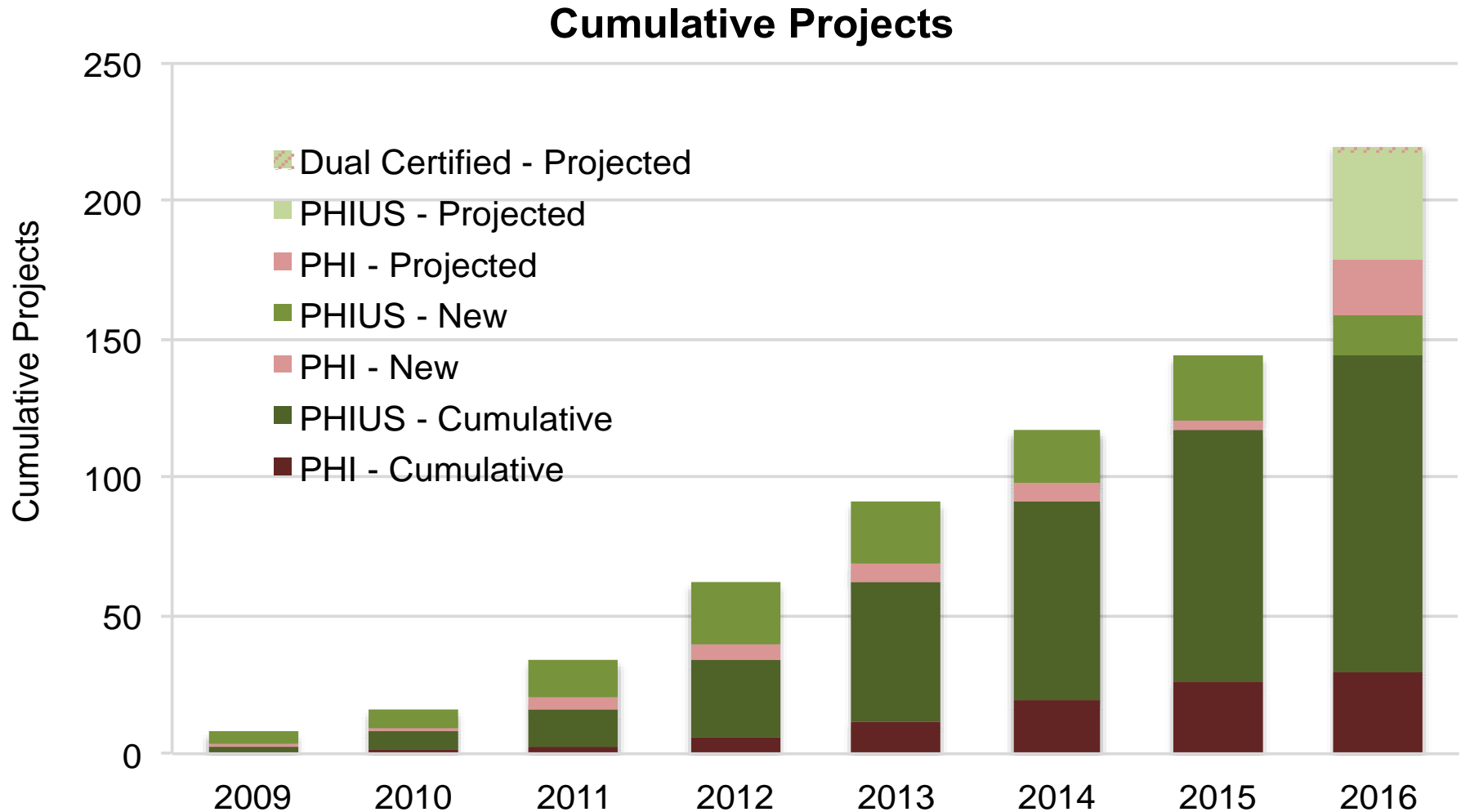
Passive House: closing the performance gap



Growth of Passive House in North America

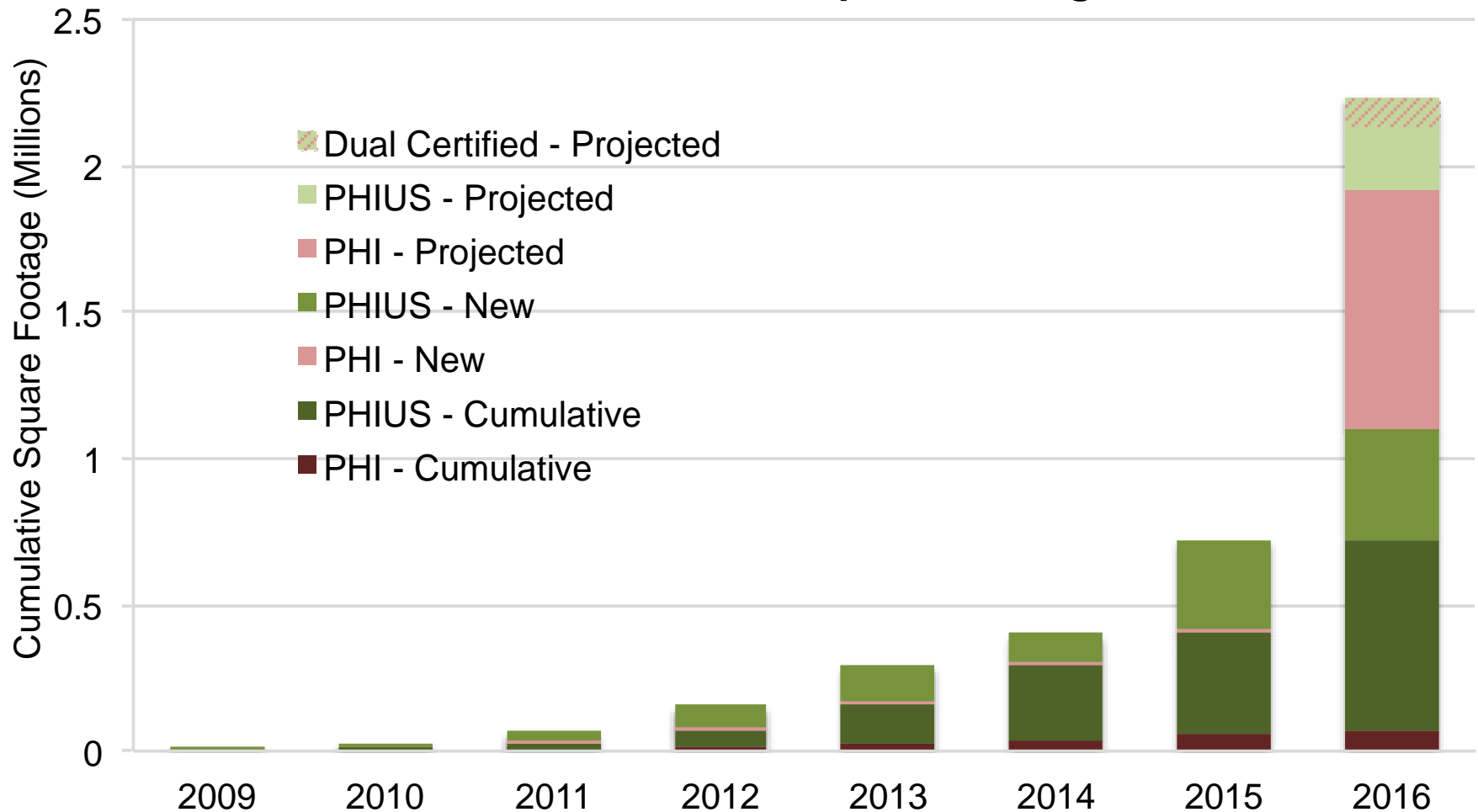


Growth of Passive House in North America



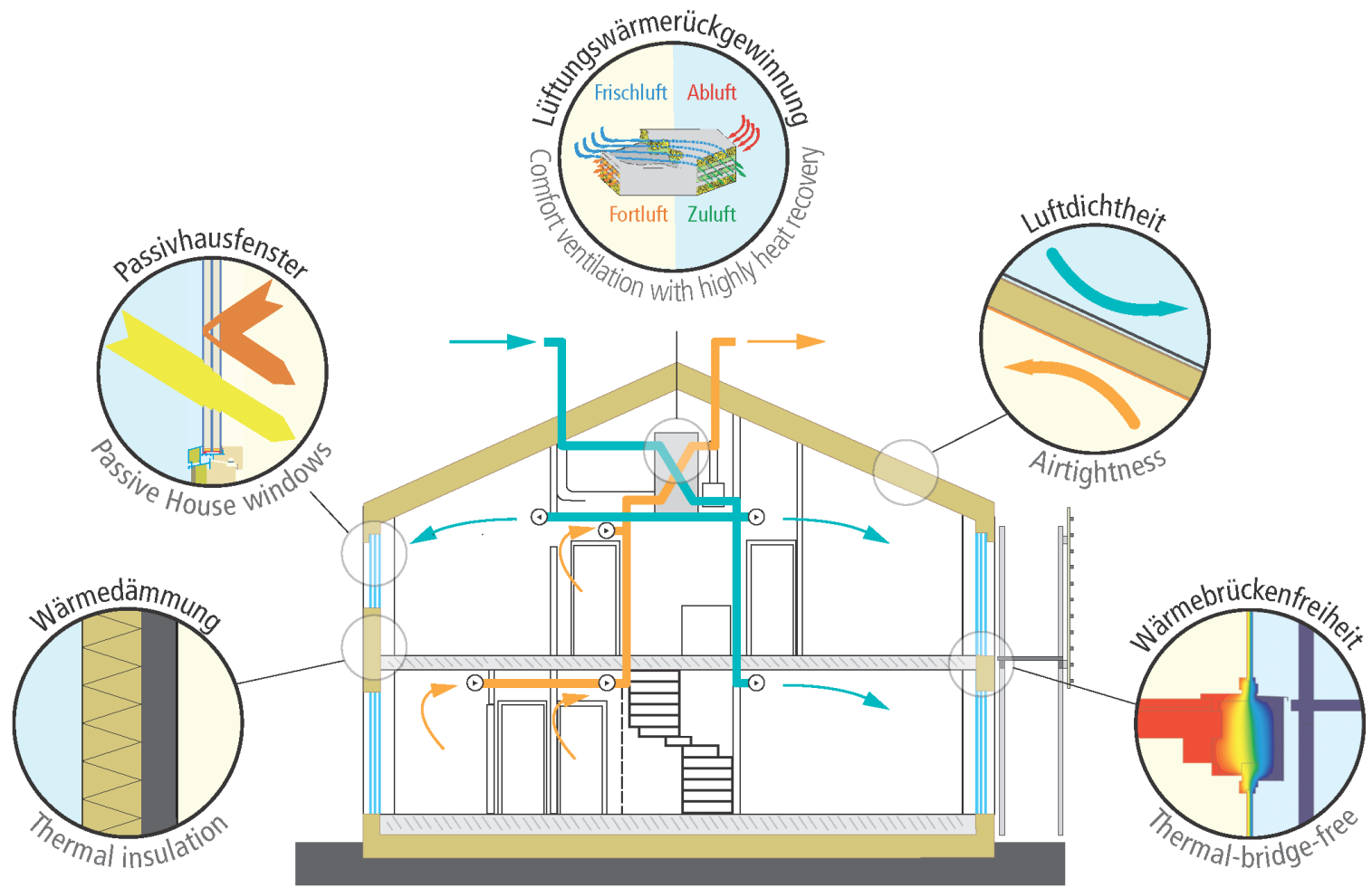
Growth of Passive House in North America

Cumulative Square Footage



HOW DOES IT WORK?

Step Level	Energy Modelling + Airtightness Testing	Equipment and Systems Total Energy Use Intensity (kWh/m ² /year)	Envelope Thermal Energy Demand Intensity (kWh/m ² /year)
Residential Buildings			
Step 1 <i>Enhanced Compliance</i>	Required	N/A	N/A
Step 2	Required	130	45
Step 3	Required	120	30
Step 4	Required	100	15
Commercial Buildings			
Step 1 <i>Enhanced Compliance</i>	Required	N/A	N/A
Step 2	Required	150	30
Step 3	Required	120	20



PART 9

Step Level	Energy Modelling	Airtightness	Equipment and Systems	Envelope
Step 1 Enhanced Compliance	Required	3.5 ACH ₅₀	BCBC using 9.36.5. OR ERS v15 ref. house (MEUI of 80 kWh/m ² /year is likely, not required)	Report on TEDI and PTL (TEDI 50 kWh/m ² /year is likely, but not required)
Step 2 10% Beyond Code	Required	3.0 ACH ₅₀	10% better than ERS v15 ref. house OR MEUI – 60 kWh/m ² /year	TEDI – 45 kWh/m ² /year OR PTL – 35 W/m ²
Step 3 20% Beyond Code	Required	2.5 ACH ₅₀	20% better than ERS v15 ref. house OR MEUI – 45 kWh/m ² /year	TEDI – 40 kWh/m ² /year OR PTL – 30 W/m ²
Step 4 40% Beyond Code	Required	1.5 ACH ₅₀	40% better than ERS v15 ref. house OR MEUI – 35 kWh/m ² /year	TEDI – 25 kWh/m ² /year OR PTL – 25 W/m ²
Step 5 50%+ Beyond Code	Required	1.0 ACH ₅₀	MEUI – 25 kWh/m ² /year (no ERS option)	TEDI – 15 kWh/m ² /year OR PTL – 10 W/m ²

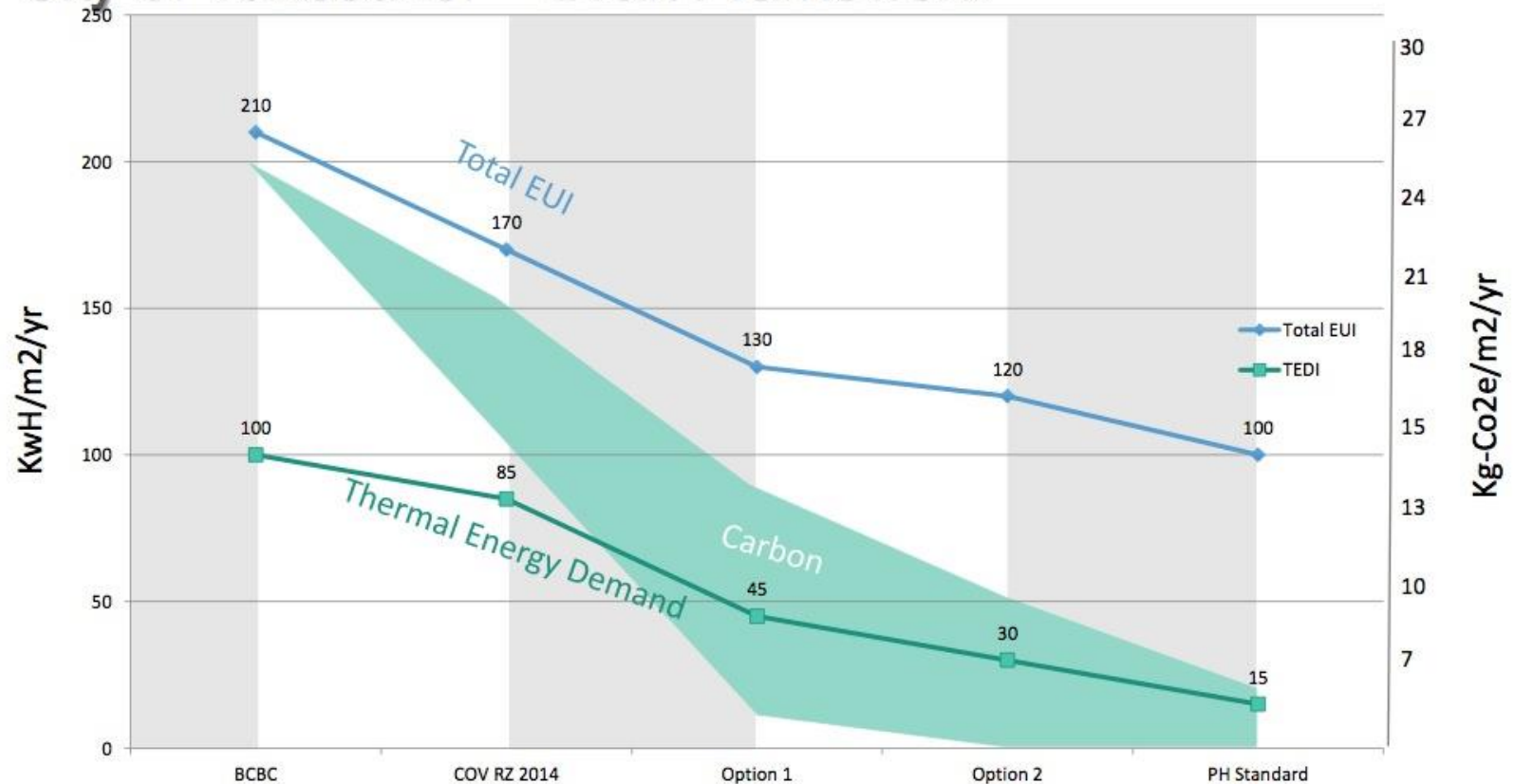
PART 9

Step Level	Energy Modelling	Airtightness	Equipment and Systems	Envelope
Step 1 Enhanced Compliance	Required	3.5 ACH ₅₀	BCBC using 9.36.5. OR ERS v15 ref. house (MEUI of 100 kWh/m ² /year is likely, but not required)	Report on TEDI and PTL (TEDI of 65 kWh/m ² /year is likely, but not required)
Step 2 10% Beyond Code	Required	3.0 ACH ₅₀	10% better than ERS v15 ref. house OR MEUI – 90 kWh/m ² /year	TEDI – 60 kWh/m ² /year OR PTL – 55 W/m ²
Step 3 20% Beyond Code	Required	2.5 ACH ₅₀	20% better than ERS v15 ref. house OR MEUI – 75 kWh/m ² /year	TEDI – 50 kWh/m ² /year OR PTL – 45 W/m ²
Step 4 40% Beyond Code	Required	1.5 ACH ₅₀	40% better than ERS v15 ref. house OR MEUI – 45 kWh/m ² /year	TEDI – 40 kWh/m ² /year OR PTL – 40 W/m ²
Step 5 50%+ Beyond Code	Required	1.0 ACH ₅₀	MEUI – 25 kWh/m ² /year (no ERS option)	TEDI – 15 kWh/m ² /year OR PTL – 10 W/m ²

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Step 2 10% Beyond Code	Required	3.0 ACH ₅₀	10% better than ERS v15 ref. house OR MEUI – 90 kWh/m ² /year	TEDI – 60 kWh/m ² /year OR PTL – 55 W/m ²
Step 3 20% Beyond Code	Required	2.5 ACH ₅₀	20% better than ERS v15 ref. house OR MEUI – 75 kWh/m ² /year	TEDI – 50 kWh/m ² /year OR PTL – 45 W/m ²
Step 4 40% Beyond Code	Required	1.5 ACH ₅₀	40% better than ERS v15 ref. house OR MEUI – 45 kWh/m ² /year	TEDI – 40 kWh/m ² /year OR PTL – 40 W/m ²
Step 5 50%+ Beyond Code	Required	1.0 ACH ₅₀	MEUI – 25 kWh/m ² /year (no ERS option)	TEDI – 15 kWh/m ² /year OR PTL – 10 W/m ²

City of Vancouver – Draft Framework



MORRISON HERSHFIELD



EnerSys

INTEG

City of Vancouver – Draft Framework

