Roadmap to Resilient, Net Zero Energy Buildings and Deep Energy Retrofits

PNWER 2015 ANNUAL SUMMIT – BIG SKY, MT – JULY 14, 2015

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RDH

Agenda

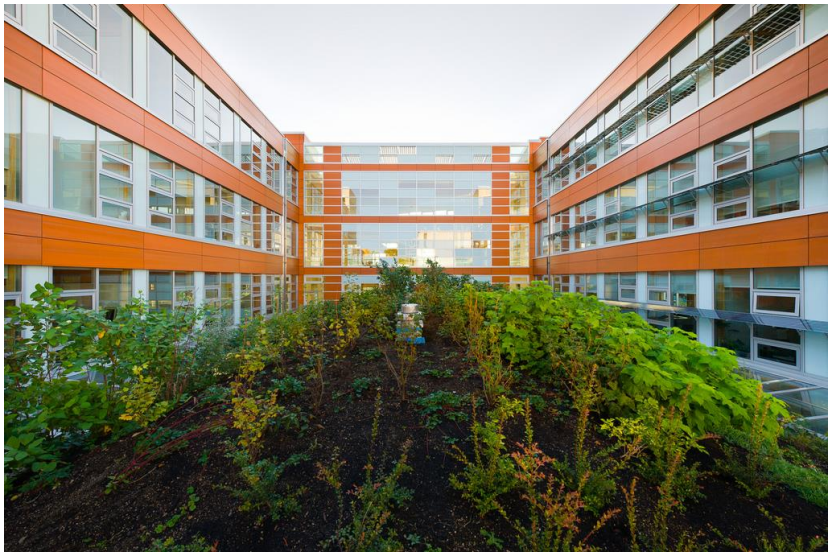
- → Overview of Roadmap
- → Policy Initiatives
- → White Paper
- → Case Study Buildings
- → PNWER Net Zero Stakeholder Network

Roadmap to Resilient, Net Zero Energy Buildings and Deep Energy Retrofits

- What is the Roadmap?
  - Document to be developed and endorsed by private sector and government leaders from 10 PNWER jurisdictions
  - Focuses on two targets for buildings:
    - Facilitate the achievement of net zero emissions for new construction by 2030, including achievement of an energy efficiency target and use of clean energy supplies (including renewable natural gas)
    - Encourage "deep" energy retrofits of existing buildings that optimize the economics of energy efficiency upgrades to lower energy bills and emissions

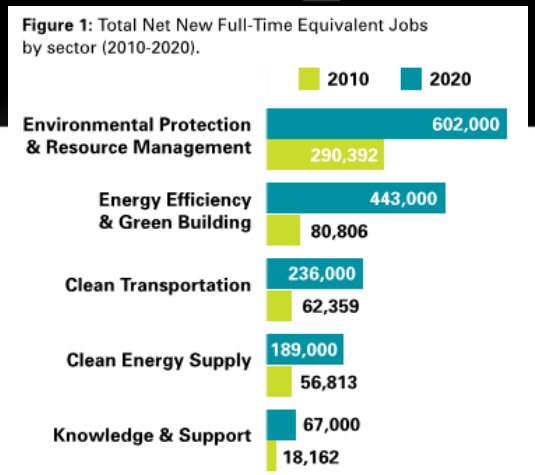
Goals for Buildings

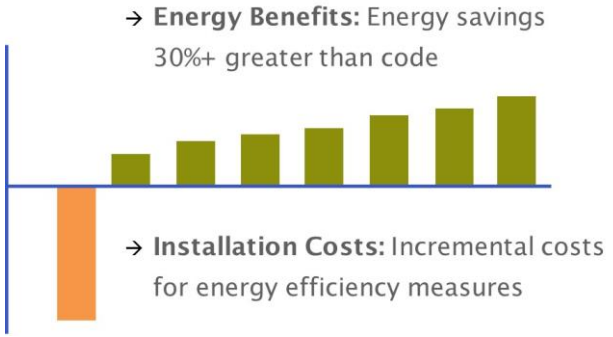
- → Affordable
- → Durable
- → Resilient to climate change impacts and seismic events
- → Comfortable
- → Healthy
- → Energy efficient
- → Increased value

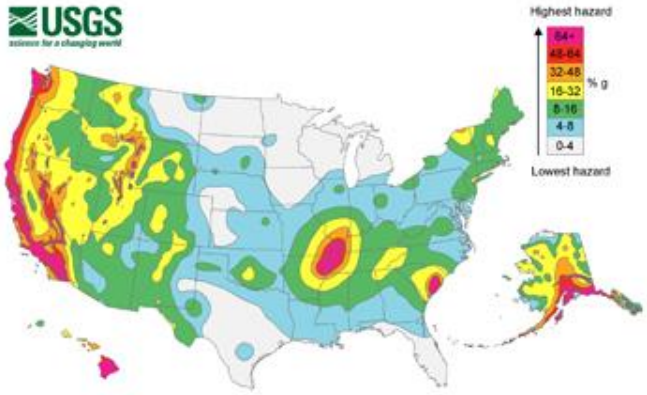


Goals for the Region

- → Promote local job creation
- → Increase affordability
- → Improve business competitiveness
- → Increase resilience







Policy Initiatives

- → City of Vancouver Green Building Policy for Rezoning
- → Financing for Building Energy Efficiency
- → US Army
- → Energy Labelling of Houses
- → New concept: tax reform

Vancouver – Green Building Policy for Rezoning

City of Vancouver *Planning - By-law Administration Bulletins*

Planning and Development Services, 453 W. 12th Ave Vancouver, BC V5Y 1V4 tel 604.873.7000 fax 604.873.7060
planning@vancouver.ca

GREEN BUILDINGS POLICY FOR REZONING - PROCESS AND REQUIREMENTS

(Formerly: Green Rezoning Process)

Authority - Director of Planning
Effective July 22, 2010
Amended June 25, 2014 and June 8, 2015

Vancouver – Green Building Policy for Rezoning

- → Implemented Jan. 2011
  - → Required to target LEED Gold certification (6 energy pts)
- → Amended June 2014
  - → 22% reduction in energy costs below ASHRAE 90.1-2010
  - → EnerGuide 84 (~HERS 45) rating for houses
- → Amended June 2015
  - → Passive House certification option

Financing for Building Energy Efficiency

- Toronto Atmospheric Fund (TAF)
  - Loans and Non-debt Energy Savings Performance Agreements (ESPAs)
  - New construction and retrofit projects
  - Shares savings with owner

Robert Cooke Co-operative Homes retrofit: $740,000

Financing for Building Energy Efficiency

- Efficiency Capital
  - Spin-off of TAF to continue energy efficiency retrofit financing

HARBOURFRONT CENTRE

Harbourfront Energy Efficiency Retrofit: Using an Energy Savings Performance Agreement, we financed the installation of energy-efficiency measures at three buildings at Harbourfront Centre.

PROJECT COST	SAVINGS SHARING (INVESTORS:CLIENT)	CO2 REDUCED
$117,000	80 : 20	51 TONNES

Leadership: US Army

- Army Energy Security Implementation Strategy published in 2009
  - Strategic Energy Security Goals (ESGs)
    - ESG 1. Reduced energy consumption
    - ESG 2. Increased energy efficiency across platforms and facilities
    - ESG 3. Increased use of renewable/alternative energy
    - ESG 4. Assured access to sufficient energy supplies
    - ESG 5. Reduced adverse impacts on the environment

Leadership: US Army

- → Army Vision for Net Zero published in 2011
- → 25 installations Net Zero energy by 2030
- → Adopted ASHRAE 189.1 standard and airtightness test

Leadership: US Army

- [Army Sustainability Report 2014]
  - 152 installations, 1billion ft^2 building area
  - 250 renewable energy projects
  - 14.2% reduction in energy use from FY03

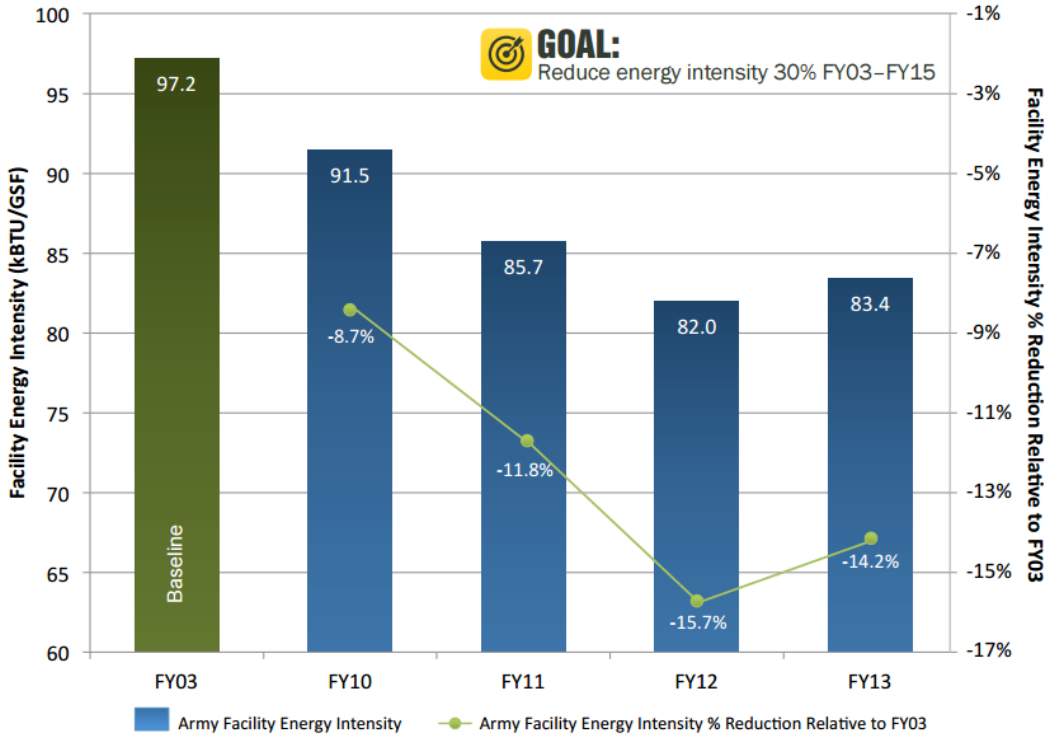
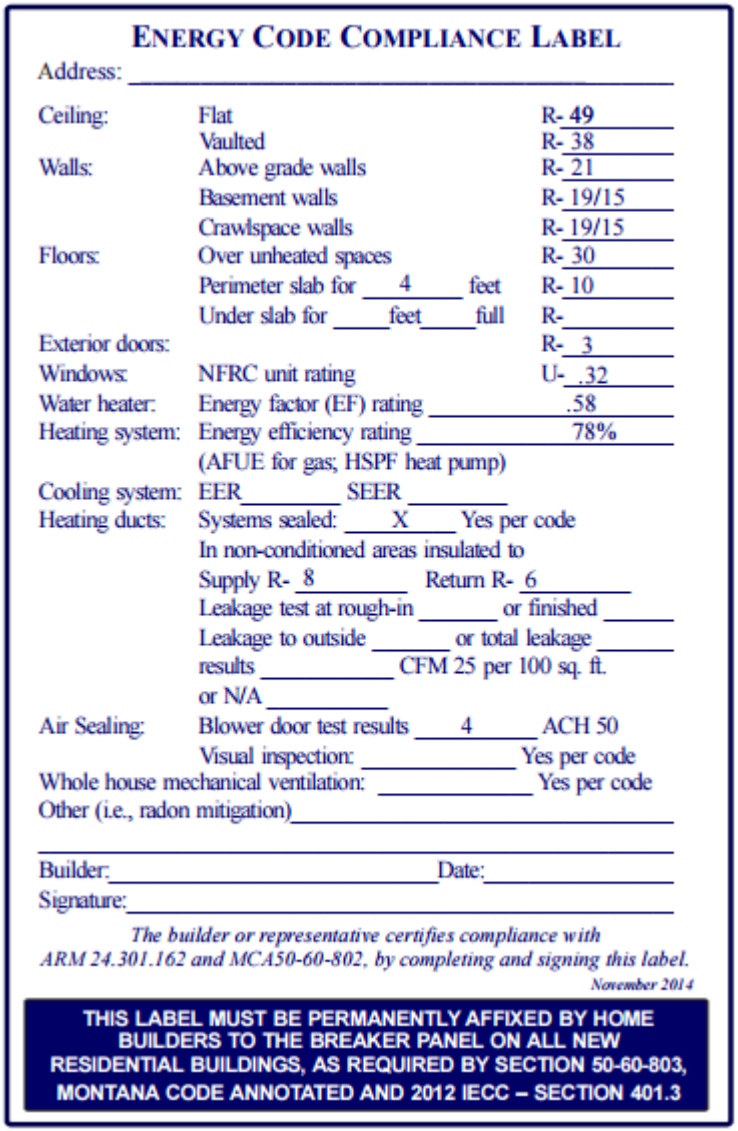


Figure 4. Facility Energy Intensity Reductions, FY10–13

Montana Energy Labelling of Houses

- New statewide energy code took effect Nov. 2014
  - Insulation and window standards
  - 75% of lights – high efficiency
  - Whole-house mechanical ventilation
  - Blower-door testing (2016) and airtightness target



ENERGY CODE COMPLIANCE LABEL

Address: _____

Ceiling:	Flat	R- 49
	Vaulted	R- 38
Walls:	Above grade walls	R- 21
	Basement walls	R- 19/15
	Crawlspace walls	R- 19/15
Floors:	Over unheated spaces	R- 30
	Perimeter slab for 4 feet	R- 10
	Under slab for ____ feet ____ full	R- ____
Exterior doors:		R- 3
Windows:	NFRC unit rating	U- .32
Water heater:	Energy factor (EF) rating	.58
Heating system:	Energy efficiency rating	78%
	(AFUE for gas; HSPF heat pump)	
Cooling system:	EER _____ SEER _____	
Heating ducts:	Systems sealed: ____X____ Yes per code	
	In non-conditioned areas insulated to	
	Supply R- 8 Return R- 6	
	Leakage test at rough-in _____ or finished _____	
	Leakage to outside _____ or total leakage _____	
	results _____ CFM 25 per 100 sq. ft.	
	or N/A _____	
Air Sealing:	Blower door test results 4 ACH 50	
	Visual inspection: _____ Yes per code	
Whole house mechanical ventilation:	_____ Yes per code	
Other (i.e., radon mitigation)	_____	

Builder: _____ Date: _____

Signature: _____

The builder or representative certifies compliance with ARM 24.301.162 and MCA50-60-802, by completing and signing this label.

November 2014

THIS LABEL MUST BE PERMANENTLY AFFIXED BY HOME BUILDERS TO THE BREAKER PANEL ON ALL NEW RESIDENTIAL BUILDINGS, AS REQUIRED BY SECTION 50-60-803, MONTANA CODE ANNOTATED AND 2012 IECC – SECTION 401.3

Sample Energy Code Compliance Certificate with Prescriptive Path Listings

New Concept – Tax Reform

- Revenue-neutral, differential real estate tax rates
  - Property transfer tax
  - Mill rate for property tax

Tax Reform Case Study

Tax Reform Case Study

- → Example of affordable passive house in Victoria
  - → Incremental cost (assume 5%) = $15,884
  - → Year 1 energy savings = $342 ($462 in 2030)
  - → Increased (insured) mortgage interest = $476
  - → No $$ value attributed to low-carbon, green leadership
  - → Property Transfer Tax increment = $318
  - → Year 1 property tax increment = $124
  - → Conclusion: added taxes = 129% of year 1 savings
  - → Every year, property tax increment = ~30% of savings
- → Revenue-neutral tax policy could transform market

White Paper

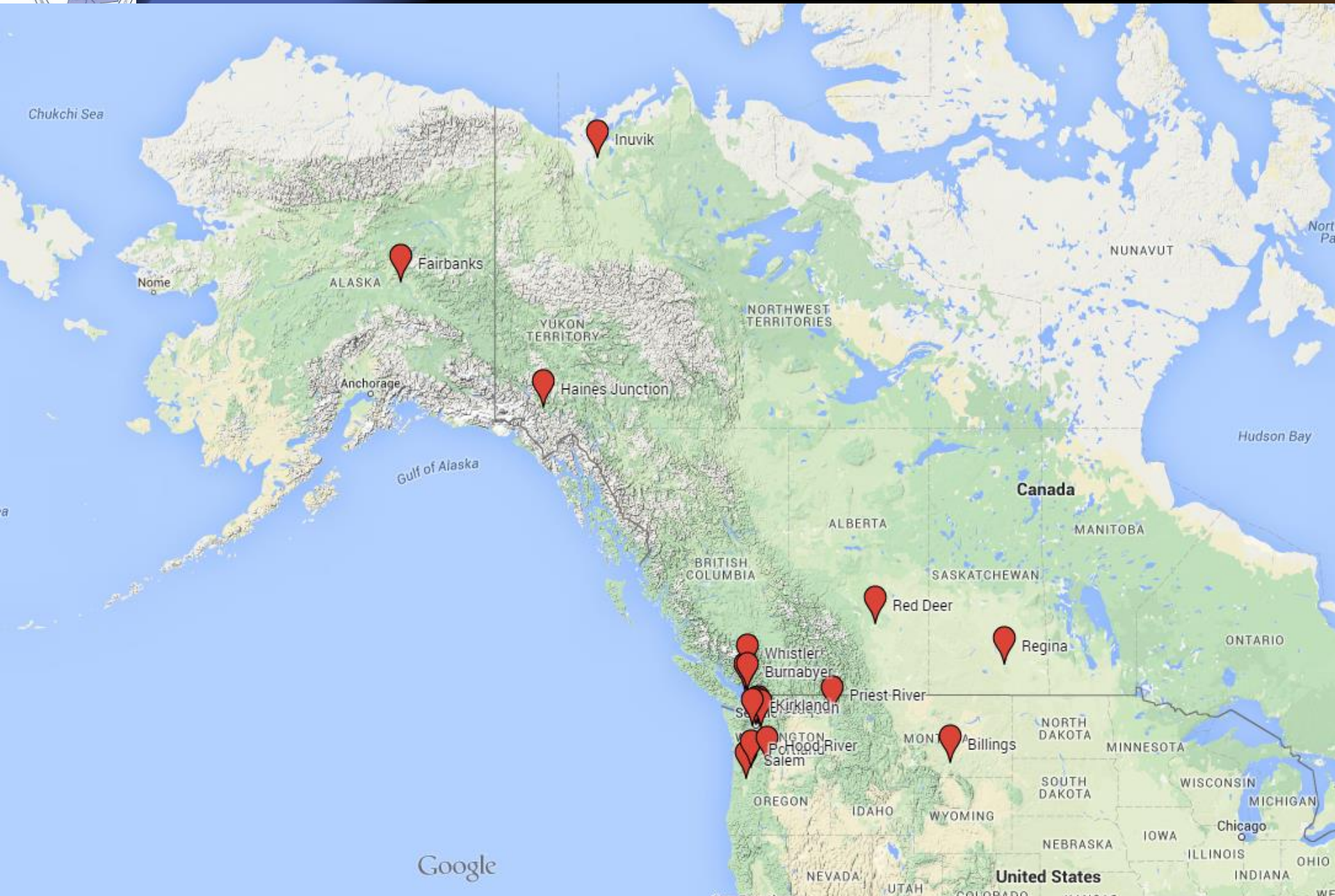
White Paper

- White Paper to support Roadmap
  - Review best practices of market and policy measures
  - Case Studies
  - Extrapolate case study data to predict impacts in each of the 10 jurisdictions
  - Estimate job creation

Case Studies

- → Net-zero ready new construction, zero-emissions, including use of renewable natural gas
- → Deep Energy Retrofits (30-70% reduction)
- → Measured utility data and cost estimates

Case Study Overview



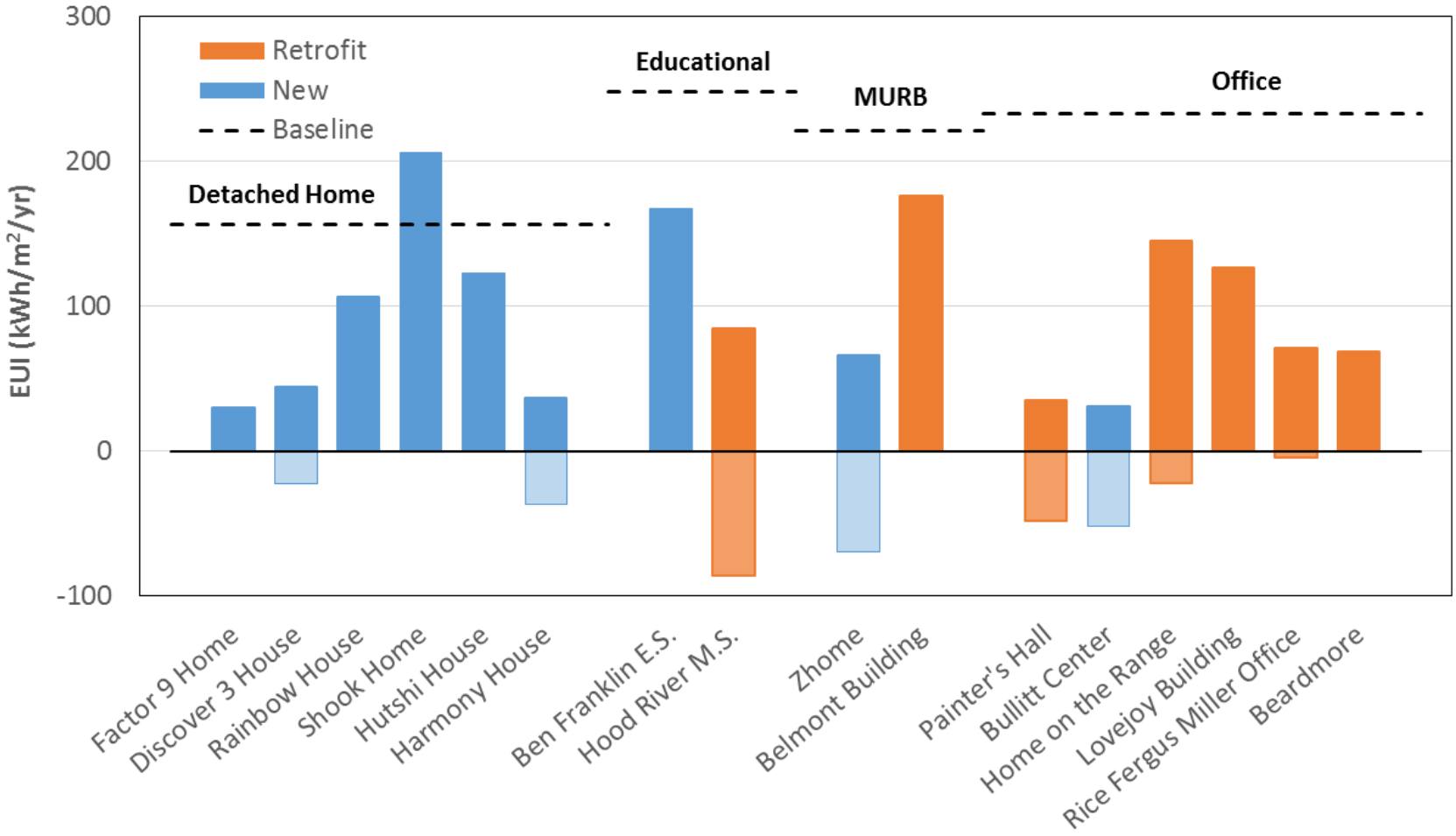
Bullitt Center, Seattle (Case Study)

Factor 9 Home, Regina (Case Study)

Belmont Building, Vancouver (Case Study)

Home on the Range, Billings (Case Study)

Building Energy Use



→ Baseline indicated is average from building specific from SHEU, SCIEU, CBECS

→ Significant energy use reductions from baseline

→ Both new and retrofits can be net-zero ready (<90kWh/m²/yr)

Preparation of White Paper

- 5 founding sponsors sought to prepare "White Paper"
  - Basis for discussions at PNWER 2015 Economic Leadership Forum in Yellowknife
  - Foundation for PNWER "Roadmap" by July 2016
- Benefits
  - Speaking engagements at PNWER events
  - Visibility among energy efficiency professionals, advocacy organizations, and businesses
  - Logo placement on PNWER website and reference in the White Paper

PNWER Net Zero Network

Network Stakeholders

- → State/provincial/territorial governments
- → Construction industry associations
- → Professional associations
- → NetZero developers/builders/contractors
- → Energy efficiency agencies
- → Local governments
- → Public utilities
- → Public interest organizations

Call for Network Chairpersons

- → Seeking one legislator and one private sector leader from each of 10 jurisdictions
- → Use the PNWER "Vision" and "Targets" as basis for community engagement
- → PNWER "White Paper" to provide data to inform discussion

Call for Network Chairpersons

→ Key actions

1. Develop contact list (with PNWER assistance)
2. Co-chairs establish 1-3 goals for each jurisdiction, e.g.,
   - Provide comments on white paper
   - Develop consensus on key policy drivers
   - Catalyze voluntary leadership
   - Establish new legislation
3. Conference call to launch 10 jurisdictional networks (with PNWER support)