



*Pacific NorthWest  
Economic Region*

**CONSTRUCTION**  
CENTER OF EXCELLENCE

# PNWER Roadmap to Resilient, Ultra-Low Energy Buildings in the Pacific Northwest

CALGARY, ALBERTA

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# Energy and Environment Agenda

- Roadmap
  - Introduction
  - Case studies
  - Region-wide impact assessment
- Policy landscape in Alberta
- CHBA net zero energy housing
- WA State workforce capacity building
- Response to Fort McMurray rebuilding program
- Action Items





# PNWER Roadmap to Resilient, Ultra-Low Energy Buildings

Andrew Pape-Salmon, RDH Building Science

- Introduction to the Roadmap
- Example case study: The Beardmore
- Delphi Trident tool



# Roadmap to Resilient, Ultra-Low Energy Buildings

## → What is the Roadmap?

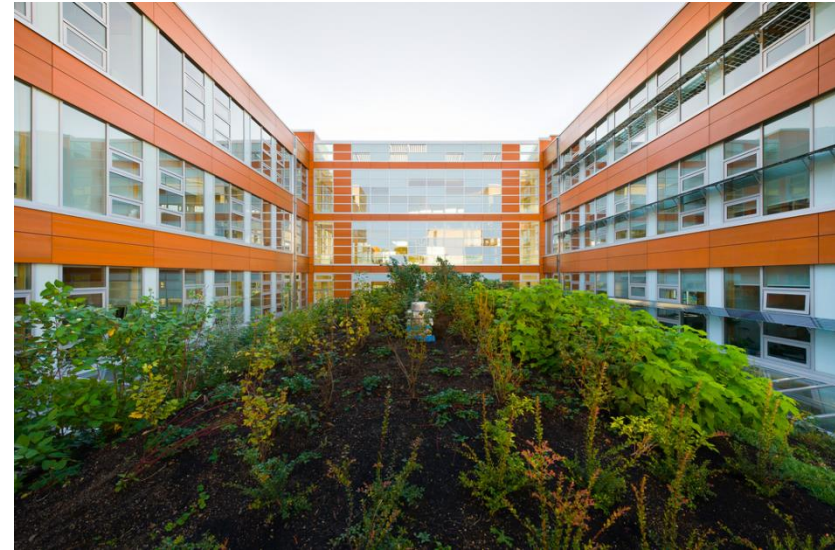
- **Document** that will be developed to seek endorsement by legislators and private sector leaders from 10 PNWER jurisdictions
- **Approach:** provide information, metrics, policy options and market mechanisms to improve energy efficiency and develop clean energy supplies
- **Includes case studies** of new and retrofitted buildings that demonstrate best practices throughout the PNWER
- **Goals** to catalyze new legislation to achieve the desired benefits and specific targets for the year 2030



# Benefits Addressing Energy in Buildings



- Affordability
- Durability
- Comfort
- Healthfulness
- Lower-carbon
- Resilience to climate change impacts
- Increased market value
- Others?





# PNWER Roadmap Next Steps



- Terms of Reference endorsed (done)
- Seek sponsors
- Develop White Paper on context and best practices
- Prepare PNWER Net Zero “Roadmap”
- Present at PNWER Summit, seek endorsement
- Convene PNWER Stakeholder Network and “Nodes”
- Conduct in-depth consultations, introduce legislation







## → Targets and Case Study Selection Criteria:

- Ultra-low energy new buildings and community-based supply, net-zero emissions
- Resilient design – climate change adaptable (extreme heat and cold, driving rain, wind)
- Specific community benefits  
TBD: # jobs, % reduction in energy bills
- ‘Deep’ energy retrofits, generally at time of building renewal, optimizing life-cycle economics
- Designs with replication potential to all jurisdictions and major sectors
- Market transformation – % increase in Cleantech investment



# Case Study: The Beardmore



- **Building Type:** Office
- **Jurisdiction:** Idaho
- **Construction Type:** Retrofit
- **Building occupancy:** Leased
- **Floor area:** 28,800 ft<sup>2</sup>
- **Original construction:** 1922
- **Retrofit completed:** 2009
- **Site description:** Existing historical building
- **Ratings:** LEED Gold, and National Register of Historic Places, Energy Star rating of 90 (out of 100)



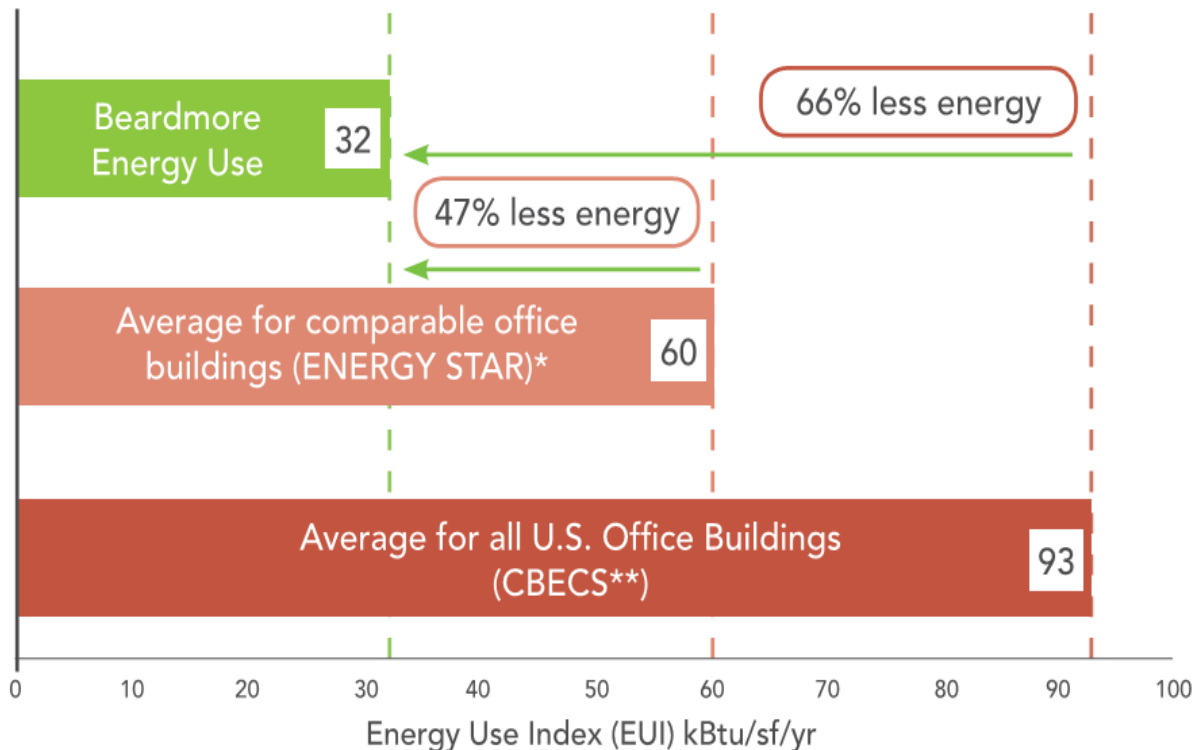




# Case Study: The Beardmore

## Strategies for energy efficiency:

- HVAC: Rooftop heat pumps, economizers controlled by occupancy, modulating outside air dampers
- Increased insulation (R-50 on roof)
- Original wood frame, low-E added; additional glazing inside



- Lighting night setback and occupancy sensors
- Commissioning, including air tightness testing
- Solar-ready



# Case Study: The Beardmore



## Resilience to Climate Change ...and other benefits

Resilience Feature	Details
Reduced heat island effect	<ul style="list-style-type: none"><li>- Shaded parking area</li><li>- Reflective roof material</li></ul>
Rainwater harvesting	<ul style="list-style-type: none"><li>- Meets demands for whole building</li></ul>
Sustainable materials	<ul style="list-style-type: none"><li>- Adaptive re-use, 95% original structure</li><li>- Restored window frames, doors, hardwood floors, light shades, skylight, (adapted) vintage toilets</li><li>- Plaster from walls → ground up and used under parking lot</li></ul>
Health, IAQ	<ul style="list-style-type: none"><li>- Particulates and VOC emissions were tested during commissioning</li></ul>
Community benefits	<ul style="list-style-type: none"><li>- Healthy, vibrant, renewed sense of entrepreneurship in the neighbourhood</li></ul>



# Region-wide Impact Assessment



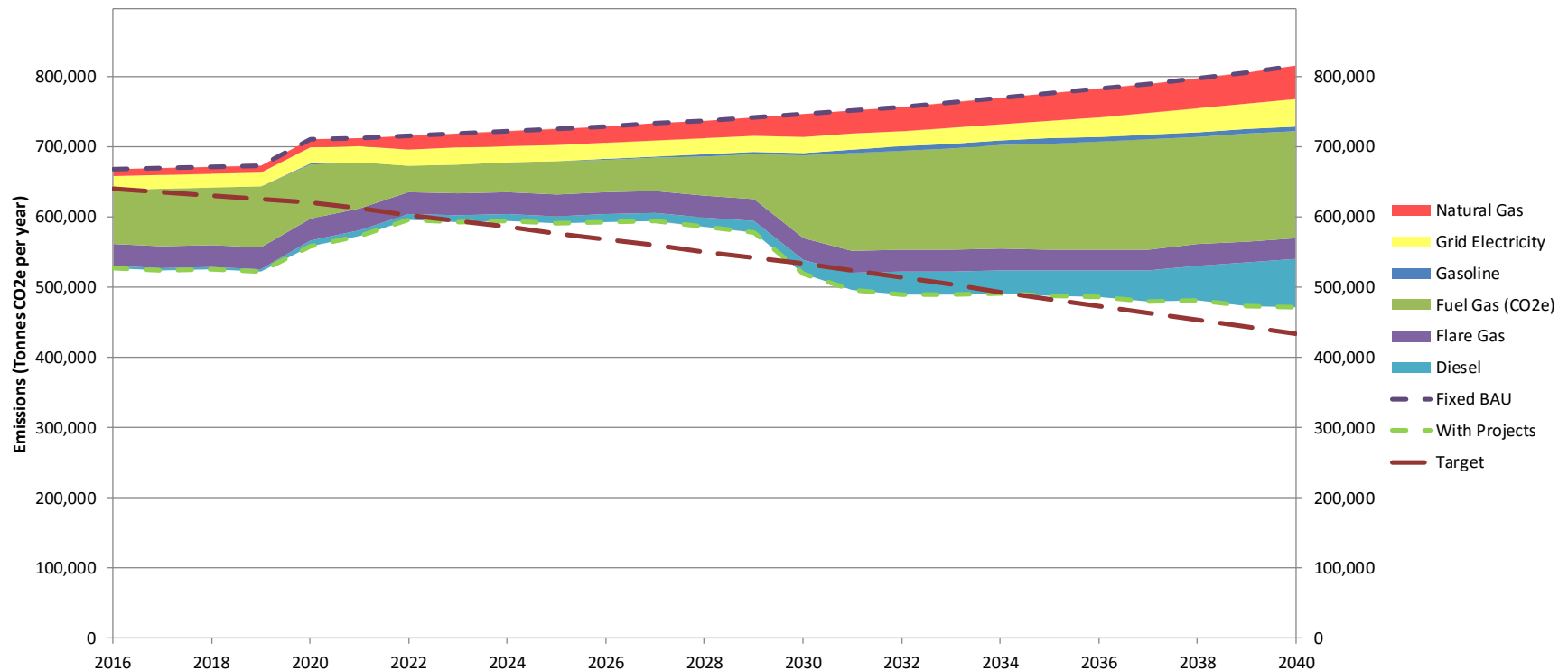
- Forecast benefits across the entire PNWR region of implementing archetypes on a region-wide scale by 2030
- *Benefits include:* Energy savings, GHG emission reductions, associated cost savings, resiliency, GDP, job creation, and investment.
- Extrapolation of case study impacts in line with:
  - Current and future building stock (residential, institutional, commercial, industrial) and floor space by jurisdiction
  - Consideration of regional climates and energy mix by jurisdiction



# Delphi Trident tool



- Trident = Delphi's energy and GHG modeling and scenario development tool.
- Generate region-wide estimates in terms of the energy and GHG emission reduction potentials (at least cost).
- Analyze BAU and a range of reduction scenarios to assess opportunities, risks, and costs of policy, programs, and retrofit / mitigation projects.





# Region-wide Impact Assessment

- An economic impact assessment will then be carried out with the projection data.
- Will include an estimate in terms of impact on jobs, GDP, and gross output.
- Will consider business and investment opportunities for service firms and product / technology suppliers across the value chain.







# Action Items



# 2015 Action Items

Action Items	Project Lead	Status
1	Steering Committee on <a href="#">Roadmap to Resilient, Net-Zero Buildings in the Pacific Northwest</a> to launch 10 jurisdictional networks led by a public and private sector co-chair. Networks develop market-based suggestions to promote energy efficiency	PNWER, Rep. Deb Boone, Paul Manson, and Andrew Pape-Salmon
2	Presentation of progress on Roadmap at Economic Leadership Forum in Yellowknife, Northwest Territories November 2015. Possibility of live-teleconference of session.	In progress
3	Identification of one or two common policy initiatives among all jurisdictions	Jurisdictional leads
4	Whitepaper released at PNWER 2016 Summit in Calgary	In progress



# Proposed 2016 Action Items



→ To be completed during discussion