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

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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
→ 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
→ Affordability
→ Durability
→ Comfort
→ Healthfulness
→ Lower-carbon
→ Resilience to climate change impacts
→ Increased market value
→ Others?
→ 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
- ‘Deep’ energy retrofits, generally at time of building renewal, optimizing life-cycle economics
- Resilient design – climate change adaptable (extreme heat and cold, driving rain, wind)
- Designs with replication potential to all jurisdictions and major sectors
- Specific community benefits TBD: # jobs, % reduction in energy bills
- 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 ft²
- **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

<table>
<thead>
<tr>
<th>Resilience Feature</th>
<th>Details</th>
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| Reduced heat island effect      | - Shaded parking area  
|                                 | - Reflective roof material                                              |
| Rainwater harvesting            | - Meets demands for whole building                                       |
| Sustainable materials           | - Adaptive re-use, 95% original structure  
|                                 | - Restored window frames, doors, hardwood floors, light shades, skylight, (adapted) vintage toilets  
|                                 | - Plaster from walls → ground up and used under parking lot             |
| Health, IAQ                     | - Particulates and VOC emissions were tested during commissioning       |
| Community benefits              | - Healthy, vibrant, renewed sense of entrepreneurship in the neighbourhood |
Forecast benefits across the entire PNWER 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
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.
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.
# 2015 Action Items

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<tr>
<th>Action Items</th>
<th>Project Lead</th>
<th>Status</th>
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<tbody>
<tr>
<td>1. Steering Committee on <a href="https://example.com">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</td>
<td>PNWER, Rep. Deb Boone, Paul Manson, and Andrew Pape-Salmon</td>
<td>In progress</td>
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<td>3. Identification of one or two common policy initiatives among all jurisdictions</td>
<td>Jurisdictional leads</td>
<td>In progress</td>
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<td>4. Whitepaper released at PNWER 2016 Summit in Calgary</td>
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<td>In progress</td>
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Proposed 2016 Action Items

→ To be completed during discussion