Outline

→ Addressing energy/emissions of existing buildings
→ Case study of a deep retrofit of a multifamily building
→ Benefits to owners, utilities and society
→ 70% of the buildings that will be present in 2030 already exist today
→ Large opportunity for improvements
→ Need to broaden scope of effort and approach
  → “Low-hanging fruit” is disappearing
→ Co-benefits
  → Comfort
  → Durability
  → Acoustics
  → Indoor air quality and health
  → Resale value, lease rate, reduced vacancies
Why Multifamily Buildings?

→ Growing proportion of the housing stock
  → 62% of Vancouver residences
→ Large proportion of electricity (19%) and emissions (18%)
Challenges in prioritizing energy efficiency in both new and existing buildings

- Developer pays capital costs, owners pay operating costs
- Strata versus owner utility bills

About 1/3 of energy bills paid by owners directly
Balance paid with condo fees
Case Study – Background

→ 13 storey multifamily residential building in Vancouver, BC
→ 37 two-bedroom units
→ Constructed in mid 1980s
→ Building renewals pursued at decision of owners to upgrade original building enclosure
Case Study – Primary Drivers

→ Replace aging building enclosure components
  → Primarily windows
→ Repair water ingress issues
→ Improve durability and reduce future maintenance costs
→ Improve comfort in suites
→ Create a modern aesthetic
→ Increase property value
→ …and save some energy
<table>
<thead>
<tr>
<th>Energy Efficiency Measure / Incremental Upgrade</th>
<th>% Total Energy Savings (% Electrical Heat Savings)</th>
<th>$ Savings per year</th>
<th>Incremental Cost with Utility Incentives</th>
<th>Simple Payback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Conductivity Cladding Attachment</td>
<td>4% (19%)</td>
<td>$4,800</td>
<td>$0</td>
<td>Immediate</td>
</tr>
<tr>
<td>Double Glazed Fibreglass Windows</td>
<td>7% (30%)</td>
<td>$7,600</td>
<td>$2,700</td>
<td>0.4 years</td>
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<tr>
<td>Triple Glazed Fibreglass Windows</td>
<td>10% (44%)</td>
<td>$11,000</td>
<td>$60,000</td>
<td>6 years</td>
</tr>
<tr>
<td>Airtightness</td>
<td>2% (7%)</td>
<td>$1,800</td>
<td>$0</td>
<td>Immediate</td>
</tr>
<tr>
<td>Fireplace Replacement</td>
<td>2% (8%)</td>
<td>$2,100</td>
<td>$14,000</td>
<td>7 years</td>
</tr>
<tr>
<td>In-Suite HRV Installation</td>
<td>6% (-32%)</td>
<td>-$4,400</td>
<td>$74,000</td>
<td>n/a</td>
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<tr>
<td>Make-up Air Unit Replacement</td>
<td>5% (0%)</td>
<td>$1,600</td>
<td>$23,500</td>
<td>15 years</td>
</tr>
</tbody>
</table>
Case Study – Building Enclosure Renewals

→ $3.6M renewals project, 7 month construction period
→ Work primarily from exterior with access to suites for window installations
Triple-Glazed Fiberglass Frame Windows
Completed Building Renewals
Benchmarking Against Similar Buildings

→ Pre-retrofit: 71 kbtu/sf per year
→ Post-retrofit: 56 kbtu/sf per year

68 kbtu/sf

Energy Consumption and Conservation in Mid- and High-Rise Residential Buildings
Key Success Factors

→ Efficiency upgrade piggybacked on building envelope renewal
→ Access to energy consumption data to “calibrate” energy analysis
→ Building science expertise
→ Broad, market transformation mandate for participating utilities through “technology innovation”
→ Application of new construction DSM program to major retrofits of existing buildings
→ Receptive building owners
Project Partners

→ BC Hydro
→ BC Homeowner Protection Office (HPO)
→ FortisBC
→ NRCan
→ City of New Westminster
→ City of North Vancouver
→ City of Richmond
→ City of Surrey
→ Enbridge Gas
→ City of Vancouver
→ BC Sustainable Energy Association
→ The Owners
Discussion + Questions

FOR FURTHER INFORMATION PLEASE VISIT

→ rdh.com