FIVE THINGS LEGISLATORS NEED TO KNOW ABOUT CEMENT AND CONCRETE
1. How cement and concrete are made

Cement
- 1.4% of Canada’s GHGs (~7% globally)
- ~40% combustion emissions
- ~60% industrial process emissions
- Multiple technology pathways needed to reduce emissions

Concrete
- Typically 7-15% cement added to water, sand and gravel
- Cement comprises up to 80% of concrete’s carbon footprint
2. Concrete is the world’s most important building material

- Concrete is the foundation of economic development and prosperity – **the world’s most important building material**
  - Virtually all construction – above and below ground – needs concrete
  - Twice as much concrete is used than all other materials combined
  - Second most consumed commodity in the world, **second only to water**

- We are a major, indispensable participant in Canada’s economy:
  - **158,000** direct and indirect jobs across the country
  - **$76 billion** in direct, indirect and induced economic impact
  - Present in every community across Canada
3 (a). Cement is among the most emissions intensive & trade exposed (EITE) sectors in Canada and globally …
Carbon leakage occurs when there is a shift in production and its associated GHG emissions to countries with laxer emission constraints (e.g. from a carbon priced jurisdiction to a non-carbon priced jurisdiction).
4. Working with governments on climate solutions is among our top priorities

Our priorities are to …

- help Canada meet its **GHG reduction** commitments
- build **low carbon, climate resilient** buildings, roads and communities
- support the development and implementation of forward thinking **policies and innovation**
- be a local and national **champion of the clean economy** transition
Cement manufacturing GHGs reduced by 20% over last 20 years

Lower carbon Portland Limestone Cement (PLC) reduces CO₂ emissions by another 10%
  - Could avoid almost 1 MT of GHG emissions per year across Canada

Substituting traditional fossil fuels with lower carbon alternatives
  - Could reduce GHGs by 2-3MT per year – another 20%-30%

Aiming towards carbon neutrality - incubator for transformative carbon capture and utilization (CCUS) technologies
  - e.g., CarbonCure, Solidia, Pond Technologies, Carboclave, Inventys, Blue Planet,
FOUR THINGS LEGISLATORS CAN DO TO HELP LINK CLIMATE POLICY WITH ECONOMIC OPPORTUNITY
1. CERTAINTY AND PREDICTABILITY
<table>
<thead>
<tr>
<th></th>
<th>Pricing Policy</th>
<th>Benchmarks/Price/Funding</th>
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<tbody>
<tr>
<td>Federal</td>
<td>• Output Based Pricing System (OBPS)</td>
<td>NOT APPLICABLE</td>
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<tr>
<td></td>
<td>• Clean Fuel Standard</td>
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<tr>
<td>BC</td>
<td>• Carbon Tax on Fuels</td>
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<td>Benchmark: None</td>
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<td>Price: $30/t (no scheduled increases)</td>
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<td>Revenue Recycling: Ad Hoc</td>
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<td>(e.g. $28M for Cement Alternative Fuels Program)</td>
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<td>AB</td>
<td>• Carbon Competitiveness Incentive Regulation (CCIR)</td>
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<td>Benchmark: 785kg / t CO2 CGL</td>
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<td>(declining 1% per year)</td>
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<td>Price: $30 rising $10/yr to $50 in 2022.</td>
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<td></td>
<td>Revenue Recycling: Emissions Reductions Alberta Tech Fund</td>
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<tr>
<td>ON</td>
<td>• WCI Linked Cap &amp; Trade System</td>
<td>Benchmark: ~803 kg / t CO2</td>
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<td>Price: Market based (~$18)</td>
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<td></td>
<td>Revenue Recycling: GreenON $ OCE Target GHG (e.g. $60M for Alternative Fuels Program)</td>
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<tr>
<td>QC</td>
<td>• WCI Linked Cap &amp; Trade system</td>
<td>Benchmark: Facility Based</td>
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<td></td>
<td>Price: Market based (~$18)</td>
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<td>Revenue Recycling: Green Fund</td>
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<tr>
<td>NS</td>
<td>• Unlinked Cap &amp; Trade System</td>
<td>Benchmark: TBD</td>
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<td>Price: TBD</td>
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# Carbon Pricing in Canada (2019)

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<td><strong>ON</strong></td>
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<tr>
<td>• Output Based Pricing System (OBPS)</td>
<td><strong>NOT APPLICABLE</strong> Benchmark: 733kg / t CO₂ CGL (static to at least 2021)* Price: $20 rising $10/yr to $50 in 2022 Revenue Recycling: TBD</td>
<td>• WCI Linked Cap &amp; Trade System Benchmark: <del>803 kg / t CO₂ Price: Market based (</del>$23) Revenue Recycling: GreenON $ OCE Target GHG (e.g. $60M for Alternative Fuels Program)</td>
<td>Federal OBPS now in effect</td>
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<td>• Clean Fuel Standard</td>
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<td><strong>BC</strong></td>
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<td><strong>QC</strong></td>
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<tr>
<td>• Clean BC Program • Carbon Tax (on Fuels) • Industrial Incentive • Industry Fund</td>
<td>Benchmark: <em>None</em> TBD. Will be required to access the Industrial Incentive and Fund Price: $30/t (no scheduled increases) $40 rising $5/yr to $50 in 2021 Revenue Recycling: Based on performance against a TBD “best in class” performance</td>
<td>• WCI Linked Cap &amp; Trade system Benchmark: Facility-Based <del>781 kg / t CO₂ Price: Market based (</del>$18 $23) Revenue Recycling: Green Fund</td>
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<tr>
<td><strong>AB</strong></td>
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<td><strong>NS</strong></td>
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</tr>
<tr>
<td>• Carbon Competitiveness Incentive Regulation (CCIR) • Technology Innovation and Emissions Reduction (TIER)? • Federal OBPS?</td>
<td>Benchmark: 785kg / t CO₂ CGL (declining 1% per year) TBD! Price: $30 rising $10/yr to $50 in 2022. $20 TBD? Revenue Recycling: Emissions Reductions Alberta Tech Fund? (TBD)</td>
<td>• Unlinked Cap &amp; Trade System Benchmark: TBD Historical intensity Price: TBD $20 floor price (+5% and inflation) Revenue Recycling: TBD Green Fund</td>
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*Note: Pricing and benchmarks for BC and AB are subject to change and may vary based on specific regional regulations and agreements.*
Certainty / Predictability: October 2019?
2 (a) MAKE COMPETITIVENESS A CORE DESIGN PRINCIPLE
2 (b) AVOID ONE SIZE FITS ALL SOLUTIONS
Output Based Performance Standards

- Output based standards are the baseline for tailoring climate policy to each sector’s unique circumstances and GHG reduction pathways

**Allows standards to be tailored to each sector’s unique circumstances**
- How is your benchmark determined?
- Comparators: Facility or Sector? Domestic or International? Average or Best in Class?
- What is the level of EITE Assistance (% of free allocations)
- Are process and combustion emissions differentiated?
- What is the carbon price?
- Stringency (tightening rates)?
- Compliance flexibility?
- Reporting criteria? Review schedule?
- Revenue recycling?
- Interactions with other climate policies?
3. ENSURE ALIGNMENT OF OTHER REGULATORY POLICIES WITH YOUR CLIMATE OBJECTIVES
OPPORTUNITY

- Replacing fossil fuel (coal, petcoke, natural gas) with lower carbon alternatives from the waste stream (e.g. urban construction waste)
- Cost competitive pathway to reduce emissions by 20-30%
- Spurs jobs, investment and innovation by material and energy from waste

BARRIERS

- Regulatory permitting agencies/processes too cumbersome
- Waste management policies not aligned with GHG reductions
  - Supply and investment uncertainty = missed opportunity
“Procurement is the *how* of reducing emissions. The only way to you’ll do things differently is by buying things differently.”
- Ron Dizy, Advanced Energy Centre
Initial Cost Decision Making: An Outdated Approach
Governments need to become champions of implementing a ‘three-screen’ lifecycle approach to align infrastructure investments with economic and climate objectives:

- **LCCA:** Full economic lifecycle cost assessment vs. traditional initial lowest cost
- **Lowest Carbon Footprint:** Comprehensive carbon cost assessment, including embodied carbon, operational carbon, end-of-life carbon and sequestered carbon impacts
- **Best Available Solution:** Assessment that considers whether the need associated with a given infrastructure project can be met using new approaches, technologies or designs that perform better than the first two criteria

*Build it once. Build it right. Build it to last.*
Portland Limestone Cement (PLC)

- Reduces GHGs by up to 10%
- Produces concrete with the same durability and performance
- Could reduce Canada’s GHGs by about 900,000 tonnes per year, at no cost premium
- The lack of requirement for public procurement to consider GHGs is a significant barrier to the widespread adoption of PLC and other low carbon technologies.
- Bar even higher for low carbon technologies that may come with a cost premium – dampens investment and innovation
4. DON’T PICK WINNERS!
Should we just build with wood?

Serious about addressing climate change? Build with wood

By Paul Lansbergen | July 5, 2016, 4:02pm

[Graph showing comparisons between wood, steel, and concrete designs,

FP INNOVATIONS: one of the world’s largest forest research centres, estimates a single 100,000 square-foot wooden building is the equivalent of taking 1,400 cars off the road each year.]

1 x 100,000 ft² ⇔ 1,400
Recent Legislative Activity

- B.C. **Wood First Act**
- Quebec’s **Wood Charter**
- Ontario Bill 19, **Ontario Forestry Revitalization Act** (14 Storey Wood Frame Buildings)
- Recent federal **Bill C-354**, An Act to amend the Department of Public Works and Government Services Act (use of wood)
- House of Commons **Standing Committee on Natural Resources Report**: Value-added products in Canada’s forest sector: cultivating innovation for a competitive bio-economy
- **Ontario’s Tall Wood Building Reference**, released late last year, offers a “distinctive Ontario-made solution” to the development, design and construction of tall wood buildings

Recent Government Funding

- The federal government’s **Green Construction Through Wood** program. The 2017 budget allocated $39.8 million over four years, beginning in April 2018, to the initiative
- The Government of **British Columbia** announced in April it will invest $7.8 million to advance wood building products and systems and promote B.C. wood overseas
- **Ontario** is investing $7.8 million into a **Mass Timber Program** to investigate the construction of wood frames for tall buildings
- **Quebec** budget 2017-18 … $46 million for innovation in engineered wood products
- Government subsidies for specific tall wood projects like **Brock Commons** (Vancouver), **The Arbour** (Toronto), **project Origine** (Quebec City), etc.
New Research: Emission Omissions

Decisions need to be based on the best possible environmental information and data.
Q: Which material is better for the climate?
A: It’s complicated!

Table ES1. Cradle-to-grave building embodied emissions (tCO$_2$e)

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<thead>
<tr>
<th></th>
<th>Concrete</th>
<th>Wood</th>
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<tbody>
<tr>
<td>Traditional Assumptions (Carbon Neutral)</td>
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<td>-36%</td>
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<tr>
<td>Scenario Including Biogenic Carbon Losses related to forest management practices</td>
<td></td>
<td>+6%</td>
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</tbody>
</table>

When combined factors such as forest regeneration rates, soil carbon loss and primary-to-new-growth-forest-conversion are all accounted for, the cradle-to-grave embodied emissions for a wood building could be 6% greater than for a concrete building.
Summary of Recommendations

- Certainty and predictability
- Integrated competitiveness mechanisms with unique sector specific considerations
- Balance regulatory “sticks” with “carrots”
- Recognize and address existing regulatory barriers to innovation
- Level Playing Field – don’t pick winners!
Thank you!

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