



## Community Questions for Lower Carbon Fuels Project

Community members joined us in the Exshaw School Gym for two Public Open House events to ask questions about the Lower Carbon Fuels Project. Research partners from the University of Calgary, Queen's University, Pembina Institute, Geocycle, WSP and Millennium -- as well as Lafarge experts -- were on hand to listen, provide updates and record questions. Questions have also been brought forward at monthly Public Advisory Committee Meetings.

### Carbon Reduction Benefits

**Evidence has not been presented showing LCFs to be superior to natural gas for reducing GHG emissions, can you provide an overview? What are the carbon/GHG benefits of the Lower Carbon Fuels? How much will the real carbon reduction amount to?**

- Lafarge's early estimates are that a 50 per cent replacement of natural gas at the Exshaw Cement Plant would result in a savings of nearly 187,927 tonnes per year of CO<sub>2</sub>. If indirect savings (processing, transportation, mining, etc.) are also included, this increases to nearly 484,306 tonnes per year. Current emissions from the plant are 1.3-million tonnes annually. While sufficient data and research exists today to provide these numbers, it's important to note that there is a research and validation project planned that will confirm these estimates.

	50% REPLACEMENT		80% REPLACEMENT	
	Direct Savings CO <sub>2</sub> (tonnes)	Indirect Savings CO <sub>2</sub> (tonnes)	Direct Savings CO <sub>2</sub> (tonnes)	Indirect Savings CO <sub>2</sub> (tonnes)
<b>Kiln 6</b>	125,284	322,870	200,455	516,593
<b>Exshaw Plant</b>	187,927	484,306	300,682	774,889
<b>Alberta</b>	274,993	656,988	439,989	1,051,181

- A typical cement plant produces about 700-800 kg of carbon dioxide (CO<sub>2</sub>) for every tonne of cement produced directly from production. About 30-40% of a cement plant's carbon direct emissions come from the use of fossil fuels used to create the temperatures to produce clinker in a cement kiln.
- How much carbon emissions will be reduced is a central question in the research project. Earlier work has indicated that some fuels—such as construction, renovation, and demolition materials—can reduce carbon emissions by over 90 per cent for every tonne of coal replaced. This assessment considered reduced emissions from mining, transportation, and processing.
- Estimating the potential carbon savings that could be achieved by replacing fossil fuels with lower carbon fuels will depend on the following factors: current fuel in use, thermal efficiency, amount of fossil fuel replaced (i.e. 50%, 80%), lower carbon fuel mix used, amount of cement produced.
- Once LCF substitution begins, Lafarge will conduct stack testing to evaluate emissions under the direction of University of Calgary and Queen's University. The Pembina Institute will be conducting a Life Cycle Analysis (LCA) during this period to evaluate carbon emissions as well as other emissions.

**Greenhouse Gas Emissions – we have not yet received any specific GHG emissions reduction information for the LCFs. The application indicates that GHG emissions are expected to go down but no concrete numbers have been presented. For BVCAS to endorse the project, Lafarge needs to demonstrate that GHGs will go down and by how much. Here are some specific questions:**

- **Please provide GHG emissions specifically for the LCF project at the Exshaw facility.**
- The estimated direct savings using a typical lower carbon fuel mix compared to natural gas in Kiln 6 are expected to be 125,000 tonnes of savings per year after the program is fully implemented. This includes supply chain emissions. While carbon savings are expected, there's much more research to be done to further assess the actual savings – especially indirect benefits.
- **Please confirm that only waste wood products will be used. We are concerned that assigning a zero emission for non-waste wood may not be valid.**
- A variety of fuels will be used, not just wood based fuels, and their carbon performance is explored in the white paper provided to the Public Advisory Committee. A zero-emission factor is not applied to all fuels, only to the biogenic fractions within them. The non-wood fuels are lower carbon intensity than natural gas when supply chain emissions are included. Research is planned to specifically assess this for the Exshaw Cement Plant.
- **Please comment on the timelines and Global Warming Potential, as they pertain to the GHG emissions reductions. For example, waste wood, if landfilled, takes a number of years to decompose and not all landfills create the same amount of methane emissions (some landfills are better sealed, some have methane capture). In some ways, burning waste wood will put GHGs into the atmosphere sooner than if the waste wood is stock piled. Also, not all waste wood is landfilled. Please comment on these items and on the GWP of methane from landfills due to waste wood.**
- More research is needed to provide a timeline for methane emissions from landfills. Alberta landfills may have different performance attributes than Ontario landfills (e.g. moisture content) which were the focus of the Queen's University study. Lafarge's main focus for the fuel program is on direct emissions (and supply chain through the planned Life Cycle Assessment). Indirect emission benefits are included in the White Paper to introduce the complex nature of carbon accounting and the planned research. On the biogenic emissions, it's worth noting that worldwide reporting legislation assigns a net zero value to biogenic carbon and this is based in turn on the carbon cycle.
- **When comparing to natural gas, upstream methane leaks need to take into account the Alberta Government's plan to reduce methane leaks. Please use the target methane leakage rate as set out by the Alberta Government. Please use a timeline for Global Warming Potential (GWP) that is consistent with other timelines used for other alternatives.**
- The leakage rate of 2 per cent used in the White Paper is considered low based on reports provided by Pembina and by some on-line research. The updated White Paper does now include a reference to the valid point raised around the government plan to reduce leakage. However, it could be many years before the actual rate is lowered to 2 per cent. As to the GWP timeline, a range is used in some of the tables to show both the 20-year and the 100-year GWP. Further work will follow by the research team to delve into this further than the preliminary estimates provided to date.

**We are concerned that the comparisons to date (by both WSP and Millennium) have been done only with coal as the baseline. BVCAS feels that Lafarge needs to compare the emissions with natural gas as well as coal and any other fuels that Lafarge is permitted to burn.**

- Lafarge is working with WSP consultants to investigate gas/coal baseline comparison.

### **Why not just use natural gas?**

- There are 4 main reasons:
  1. Many fuels as combusted release lower carbon emissions than natural gas, a typical lower carbon fuel mix will have a carbon intensity 20 per cent lower than natural gas.
  2. The methane emissions associated with upstream natural gas supply are significant and raise the total system carbon emissions to a similar level to coal. When adjusted for supply chain emissions, a typical lower carbon fuel mix are about half of natural gas' carbon intensity.
  3. While natural gas, as used, is a lower carbon fuel than traditional solid fossil fuels, it is reasonable to add additional lower carbon fuel choices to accommodate price fluctuations.
  4. Carbon pricing will shift economics to increase the proportions of lower carbon fuel choices.

### **What are the components that go into the LCA calculation for the various fuels? What considerations/numbers are added, what considerations/numbers are subtracted? Can a specific example be provided to walk us through the calculation?**

- A LCA approach ensures that CO<sub>2</sub> emissions from mining, transportation, and processing are counted. For example, there are CO<sub>2</sub> emissions from mining coal, transporting coal, grinding coal, and combustion of coal. Similarly, used shingles, railway ties, C&D, and other fuels need to be collected from their point of generation, transported, shredded, and used as fuel. In the case of natural gas, emissions of methane from the well head and from various leaks in the distribution system need to be considered.

### **What is your response to critics who say the conceptual framework of biogenic carbon neutrality is flawed and that the combustion of wood products will increase levels of atmospheric GHGs?**

- Biogenic carbon is recognized globally as carbon neutral due to the carbon cycle. Fossil fuels are concentrated forms of carbon that are sequestered in coal mines, natural gas pockets, oil sands, and oil reservoirs. Combustion releases this carbon into the atmosphere without any corresponding conversion of this carbon back into the environment. In contrast, "biomass" or "biogenic" materials are used within the carbon cycle. For example, consider the growth of a tree. Carbon is withdrawn from the atmosphere into the stalk of the grass and then it is harvested and used as a fuel and consequently the previously converted carbon is released back in to the environment – but the amount of carbon in the atmosphere remains the same. This remains true if forests are managed sustainably. Most of the ongoing discussion from critics relates to harvesting trees solely for fuel. Lafarge is seeking trees that have already been harvested for use in wood products.

### **Can you further explain the timing of natural carbon cycles?**

- Emissions of carbon from biogenic carbon (or "biomass") are considered to be neutral carbon emissions by regulators and other agencies. This is a frequently discussed and interesting topic.
- In the case of short carbon cycles, consider a field of switchgrass purposefully grown for fuel use. Carbon from the atmosphere is taken up by the growing plants and then released back into the atmosphere when the grasses are used for fuel within the same year.
- Forest carbon: An assumption here is that the amount of biomass in the Canadian forest remains relatively constant from year to year based on sustainable forestry practices. If the mass of forest biogenic carbon remains a constant, this means that the amount of carbon removed for wood products (and then ultimately used as fuel by Exshaw) is replaced at the same time by the remaining tree growth.
- Put another way, as an example, if it takes 50 years to grow a mature tree and if we sustainably only harvest one tree out of 50 in a mixed forest that maintains a constant mass, then we must have annual new growth that replaces the carbon removed. That is, if the amount of carbon in the forest remains the same, then the amount withdrawn for products and then combustion must be equal to the amount taken up by the forest, thus closing the carbon cycle and demonstrating that biogenic

carbon is carbon neutral.

- One of goals of the LCA work planned for the coming years, based on the proposed demonstration project, is to further delve into these and other questions. Lafarge believes all of the fuels selected are in safe use in cement plants today and this work will help us understand any Exshaw specific aspects of their use and to understand the full carbon attributes of these fuels.

### **Can you explain methane leakage effects on natural gas carbon intensity?**

- As noted in the white paper, methane's global warming potential (GWP) is 28 times worse than CO<sub>2</sub> according to the Intergovernmental Panel on Climate Change (IPCC). The Alberta GWP factor is 25. Both factors are based on a 100-year time frame. However, since the next 20 years are of great significance to the ability to transition to a lower carbon economy, many stakeholders argue that the 20-year GWP for methane (i.e. 86 times CO<sub>2</sub>) should be used instead of the 100-year GWP.
- The other relevant factor is the percentage leakage rate from the source to the fuel user. In the white paper, Lafarge used 2 per cent, but there are studies that indicate this is a low number. For these reasons, Lafarge put a range for supply chain emissions and elected to show the 20-year GWP and 2 per cent leakage rates as a compromise between the two extremes.
- Ultimately, both policy and technical work needs to be done to move closer to an agreed upon upstream emission factor for natural gas. This could be made more complex by the myriad of different wells, different distribution systems and leakage efficiencies, and different chemistries of natural gas. The White Paper was written to illustrate that carbon emissions should be evaluated not just at the Exshaw cement plant's stack, but should also consider life cycle sources. The research team will be fleshing this out in the coming years as it is an important question.
- As a side point, as system emissions are better understood—and priced—then the final delivered price of fuels will encompass all carbon emissions and will allow Lafarge to benefit from reducing carbon emissions beyond its plant borders.

### **What kind of fuel is being proposed?**

- Lower Carbon Fuels will include eight main streams: carpet and textiles (non-recyclable); treated wood products; asphalt shingles; wood products; plastics (non-recyclable); rubber (non-recyclable); construction, renovation and demolition waste (CRD); tire fluff
- The proportions of fuels may vary in the LCF to maintain the specified heat content. To ensure all fuel mixes (including individual fuel types) are addressed, the modeling and risk assessments have taken the most conservative values from among these 8 fuel types.

### **How much fuel?**

- For Phase 1, where LCF account for 50 per cent of total kiln fuel, the total consumption is 125,000 tonnes for 330 days of operation to produce 1.35 MT of clinker.
- For Phase 2, where LCF amounts for 80 per cent of total kiln fuel, the total consumption is 200,000 tonnes for 330 days of operation to produce 1.35 MT of clinker.

## **Traffic Increases**

### **If LCFs are superior to natural gas for reducing GHG emissions, what is the amount of increase in truck and rail traffic? What will be the increase in truck/rail traffic and how will impact on the community be mitigated?**

- LCF are typically sourced within a 300-kilometre radius from cement plants to keep transport costs low. The fuel categories selected are based on a study of what types of materials are available in Alberta. Rail is not feasible since these lower carbon fuels are being sourced locally and regionally. Additionally, Lafarge doesn't have the design and cost of the additional rail siding to receive by rail in its project plans.

- For Phase 1, where LCF accounts for 50 per cent of total kiln fuel (120,000T/year), Lafarge is estimating 15 inbound trucks per day (330 days/year). For Phase 2, where LCF amounts for 80 per cent of total kiln fuel (200,000T/year), Lafarge is estimating 24 inbound trucks per day (330 days/year).
- A Traffic Impact Assessment (TIA) was completed by WorleyParsons Komex in November 2007 to assess the impacts of traffic related to the Exshaw modernization project. At that time a baseline of 27 coal trucks was used with a post construction estimate of 32 trucks per day. Based on 50 per cent and 80 per cent substitution of LCF, traffic impact is negligible.
- The trucks will come from both directions. However, Lafarge anticipates the majority will come from the Calgary region. LCF (ready for processing, partially or fully processed) would be transported to Exshaw Plant by a third party using enclosed trailers or containers, and unloaded into a purpose-built handling system. The trailers could be self-unloading (walking floor or dumper), standard “fixed frame” or carrying “roll-off” containers. The materials could be loaded as bulk or packaged (bales, containers). The third party will be required to specify in the supply contract an environmental control plan to reduce any risk of product release on route to the plant as well as having a spill response plan for the plant site.

**Has the third-party traffic study referenced in the April 20, 2017 PAC minutes been distributed?**

- The draft TIA for LCF determined that impacts to traffic are negligible. However, the study needs to be revisited to account for the proposed traffic flow patterns for the existing operations.

## Processing Onsite

**Is Lafarge seeking a permit for shredding activities? Would this require a separate permit amendment in the future? What type of materials are proposed to be processed onsite?**

- Lafarge is seeking approval from Alberta Environment to shred lower carbon fuels, however, this does not include the shredding of treated wood products.
- The processing of materials on site will require an amendment to the MD of Bighorn's Municipal Development Plan and the Land Use Bylaw. Once these amendments are approved, Lafarge will apply for a development permit for processing on site.
- Current plans are that railway ties will be shredded at another location and will meet all necessary requirements for permitting and environmental controls. As experience is gained, shredding of railway ties at the Exshaw may be trialed; but this will require a permit amendment and stakeholder consultation.

**What volume of materials are proposed to process onsite?**

- The maximum onsite fuel storage capacity (final Phase II)— based on 80 per cent total heat substitution—is approximately 3,000 tonnes.

**What type of processing will be proposed onsite and how will fugitive particulates be eliminated?**

- The exact type and configuration of the processing and material transport equipment within the LCF processing building will depend on the characteristics of the LCF within the proposed streams.
- The major processing step for LCF will be screening, shredding, blending and the removal of non-combustible components by manual sorting, magnets, wind shifters. The fully processed LCF would then be directed towards the “ready-to-burn” storage area for firing in the cement kiln.
- Lafarge is proposing to build an LCF storage facility with processing capabilities including receiving,

storing, sorting, screening, blending, shredding, grinding, de-lumping, magnetic separation, metering, sampling and testing, thawing, and other similar fuel processing activities.

- Pending receipt of all approvals, Lafarge hopes to be co-processing LCF onsite by Spring 2019.

### **I think the fact Lafarge moved substantially away from the large-scale processing of LCF onsite to the delivery and limited storage of materials onsite calmed a public concern**

- Due to concerns from the PAC around fire and vapors with rail tie processing/shredding, Lafarge agreed to only pursue permits for onsite processing/shredding of all fuels EXCEPT rail ties. This is still our most current direction for the following reasons:
  - all processing facilities would be designed with environmental/safety/health concerns sufficiently addressed,
  - plant operating permit expires May 2019 and Lafarge does not plan on introducing anything "new" in terms of the renewal; therefore, fuel processing capabilities is desired to be included now with this LCF permit amendment,
  - although most of the proposed fuels will likely arrive from Calgary area in a pre-processed condition, there may be local sources that Lafarge could process locally, excluding rail ties
- Storage and onsite processing would be implemented in a phased approach:
  - Phase 1: expanded storage, no onsite processing, 50 per cent LCF
  - Phase 2: expanded storage, onsite processing capability, 80 per cent LCF

## **Asbestos**

### **Are the shingles asbestos shingles?**

- Asbestos was commonly used in many asphalt roofing materials but rarely in shingles. The amount of asbestos used in shingles was typically **less than** 1 per cent; the National Emission Standards for Hazardous Air Pollutants defines Asbestos Containing Material (ACM) as any material containing **more than** 1 per cent asbestos. Shingle recyclers did extensive testing in 2013 to confirm that asbestos is not present at levels of concern. Asbestos was detected in just over 1 per cent of the samples (out of over 27,000 samples). With this information, we do not anticipate asbestos to be an issue with lower carbon fuels. Geocycle and LafargeHolcim have successfully used shingles as a fuel in cement kilns for many years in both the U.S. and Canada. Workers involved with low carbon fuel systems wear protective safety gear that prevents exposure to airborne dust. As part of our qualification process, we will ask suppliers of shingle materials to certify that their materials do not contain asbestos.

### **What is in construction waste? Is there asbestos in the fuel?**

- Construction Renovation and Demolition waste (CRD) includes wood, concrete, asphalt, drywall, metal, roofing material, cardboard, papers and plastics. Government regulations require a hazard assessment (including asbestos assessment) to be completed before any demolition/construction permit is issued. Asbestos is not known to have been used in any these materials, except shingles and drywall. Drywall will not compose any portion of the CRD fuel. Shingles do not contain asbestos at levels of concern.

## **Carbon Tax**

### **How will the new carbon tax system be implemented for cement plants in AB? Will Lafarge benefit from the new system?**

- Alberta is implementing a hybrid system comprised of both Cap & Trade emission trading and a carbon levy. The Lafarge Exshaw Cement Plant will fall under the Cap & Trade system. Due to its recent

investment in new technology and other modernization measures that mitigate emissions, the plant will initially have surplus allocations that can be banked or sold. However, over time, Lafarge will be incurring costs as the cap on carbon emissions lowers.

### **To what degree is the carbon tax driving this project?**

- The carbon tax is a very compelling reason for developing the plan to replace fossil fuels. It is designed to push industry to use lower carbon fuels. But, it isn't the only factor. Lafarge has made a global commitment to implement measures to reduce greenhouse gases and the use of lower carbon fuels is an important tool to reach this goal. By 2030, LafargeHolcim wants to produce 40 per cent less net CO<sub>2</sub> per tonne of cement than 1990, helping remain the most CO<sub>2</sub> efficient global business in our sector. Lafarge can help achieve this goal by using more lower carbon fuels and reducing the amount of fossil fuels used - also reducing emissions from fossil fuel mining and transportation.

## **Cost**

**How much more expensive is it to use LCF as opposed to coal/natural gas? Who is looking at the economics of the project? How much are you going to spend on this fuel? Will LCF prices rise in the future with increased use? What is the cost difference between LCF, natural gas, and coal?**

- Lafarge & Geocycle will conduct most of the economic analysis. While a lower cost is anticipated over time, significant investment is required to re-tool the plant to use lower carbon fuels. Lafarge and its partners will need to invest over \$20 million to build the supply chain and the fuel handling systems required. Investment includes equipment to collect, transport, process and store the fuel as well as the handling and injection equipment. There are also ongoing expenses including maintenance and operating costs, supply chain management, quality control and compliance with permitting and environmental requirements.
- As the use of lower carbon fuels is more accepted by industry, the demand may exceed the supply for some streams, which may increase prices. This is partly addressed by the strategy to have a wide variety of fuel categories tested for future use. Additionally, carbon pricing will raise the price of fossil fuels (coal, natural gas) and lower carbon fuels will be more competitive as a result.

### **Natural Gas market dynamics:**

- Ultimately, the end goal of carbon pricing systems is to price them out of the market (or that the carbon emissions will be captured and used or stored). This means in turn that the sequestered carbon that these reserves represent could remain sequestered. Carbon pricing constitutes a "nudge" to the economy to move to other lower or zero carbon energy sources. In the meantime, natural gas will continue to be used—less and less over time as it gets more expensive.
- Carbon pricing is applied to carbon emissions to the environment and the natural gas industry may indeed seek to find non-combustion markets for its natural gas. It's an interesting question, outside of our purview, as to the degree to which methane emissions from natural gas product supply chains will be controlled or priced.

## **Dust**

**Will the Back Mountain project create more dust in Exshaw?"**

- Dust levels coming from the quarry should not change as we move to Quarry Phase 2 (Back Mountain).

**Would dust travel to Banff or Canmore with the use of lower carbon fuels?**

- No. Dust would not travel to Banff or Canmore with the use of lower carbon fuels. Lafarge must comply with emissions regulations established by the Government of Alberta. The authorization to use lower carbon fuels is based on the principle of no significant increase in stack emissions, while continuing to meet the same or more stringent emission limits. This is true for dust and other potential pollutants.

#### **Why are we still seeing dust on new snow?**

- Lafarge has made significant improvements in reducing fugitive dust since 2012, as shown in the quarterly reports provided to the MD of Bighorn. Every year on record, the December-February months show an uptick in fugitive dust levels. This is from the inability to routinely utilize sweeping and water control on roads due to freezing conditions and the increase of high wind occurrences.
- A partial list of the improvements made in just the last 18 months include installation of the EcoDome (covering raw materials), wind fence modeling/engineering, additives hopper misting, cattle guard installation to dislodge dust from departing truck traffic, red shale covered storage, concrete paving of site roads, new sweeper covering a larger area along Hwy 1A, GPS installations on sweeper and water truck, unpaved road treatments, multiple water application trials on blasting dust, installation of new Windridge air monitoring station, public and control room website for specific air monitoring data, daily monitoring of air monitoring data, new cameras installed on existing raw material storage hall doors, continuing paving and hydroseeding in expansion plant areas.

#### **While blasting, can you consider spraying some water to reduce dust?**

- When the weather is above freezing, Lafarge wets the ground in front of the blast. This practice has been going on since 2013. Additionally, Lafarge has been trialing a "FireBozz" suppression system to see if we can further reduce blasting dust.

## **Emissions/Air Quality**

#### **Concern about Criteria Air Contaminants (CAC) and other air pollutants.**

- Overall, emissions are not expected to change based on experience at other sites. However, research partners will conduct before and after emission testing and these results will be shared with the community. Regardless of the positive experience at other sites, the plant must remain within compliance of government emission limits designed to be protective of human health and the environment. Further information on emission categories are outlined below.
  - **Organic Compounds.** Research (e.g., <http://cement2020.org/publication/all/191>) shows that high temperatures, long residence times, and good mixing of oxygen with fuel leads to highly efficient combustion -- these conditions are also necessary to produce good quality cement. Cement kiln operating temperatures are significantly higher than boilers and other combustion devices due to the need to produce the final product. Test data indicates that the organic portion of LCF is consumed as fuel in the kiln at an extremely high efficiency.
  - **Inorganic Compounds.** Non-combustible portions of fuel (ash) are a source of raw materials but tend to represent a very small fraction of the total solid, non-combustible component input to the cement kiln process, the majority coming from raw materials such as limestone. Due to this small proportion, fuel ash tends to have negligible effects on emissions as test results have shown. The inorganic residues in lower carbon fuels that may contain metals, minerals, and other elements are integrated in the clinker structure as is the case with other raw materials. There is an exception for volatile metals such as Thallium and Mercury -- present in many natural raw materials and fuels -- which are controlled through kiln dust management and filter temperature. The emission testing

program will include metals including mercury and thallium.

- **Particulate Matter.** The plant employs a baghouse system to collect “dust” from the end of the process. As noted above, most of this particulate matter consists of finely ground raw materials with a small amount (<1%) being comprised of non-combustible materials present in solid fuels (ash). The baghouse is a highly efficient control technology (considered Best Available Control Technology (BACT) by governments). The use of LCF has not been shown to have any effects on the efficiency of the baghouse in other testing programs and this will be validated in the planned testing program.
- **Oxides of Nitrogen (NOx).** While some cement plants have seen a reduction in NOx formation from the use of LCF, this benefit may not be achieved in the early stages. As to emissions, the Exshaw plant is equipped with a NOx control system that can be adjusted as necessary to maintain NOx emissions at the low levels needed for compliance regardless of LCF usage rates etc.
- **Sulphur Dioxide (SO<sub>2</sub>).** As with the controls for NOx emissions, the plant has a control system for SO<sub>2</sub> which will maintain these levels well within compliance of emission limits.

#### **What are PAHs?**

- Polycyclic Aromatic Hydrocarbons (PAHs) are a group of more than 100 different chemicals that are released from inefficient combustion of coal, oil, gasoline, trash, tobacco, wood and other organic substances such as charcoal-broiled meat. They can occur naturally from forest fires and volcanoes. They can also be manufactured. Other activities that release PAHs include driving, agricultural burning, roofing or working with coal tar products, sound- and water-proofing, coating pipes, steel making and paving with asphalt. Lafarge tests PAHs biannually on both kiln stacks.

#### **What are the emissions from creosote rail ties?**

- Railway ties have been tested at other cement plants and no statistically significant emission changes were identified other than a reduction in carbon emissions for every tonne of coal replaced. Some studies show that emissions are lower from railway ties than wood due to the higher combustion temperatures resulting from the creosote present in the wood tie. One of the central aspects of the project is to conduct third-party emission testing and share results with the community. Continued use will depend on this third-party confirmation and compliance with government regulations.

#### **What emissions do you get from kerosene?”**

- Lafarge is not proposing to use Kerosene. It is not considered a low carbon fuel.

#### **Would like to know results from test burns -- which emissions are present?**

- Third-party emission testing, overseen by the project’s research team, will be conducted and the results will be shared with the community.

#### **Would using waste as a fuel increase the pollutant concentrations in Canmore and Banff? Are there other toxic emissions from alternative fuels like shingles, plastic, tires?**

- No. Co-processing waste in cement kilns may result in a change to stack emission "fingerprint" (relative concentrations of different compounds) but does not statistically change the overall emissions.

#### **If you do not end up burning these fuels, is there no carbon emitted?**

- If these materials are not used as fuels they may be landfilled or incinerated, producing CH<sub>4</sub> and CO<sub>2</sub>. Replacing traditional fuels with lower carbon fuels produces less CO<sub>2</sub> globally.

## **Fuels**

### **Are you going to look at solvents or paint sludge?**

- While these are fuels in use in cement plants in North America, they are not under consideration. A market study has been conducted to help determine the most available and sustainable fuels for Exshaw and eight have been chosen: construction renovation/demolition waste, non-recyclable plastic, carpets and textiles, shingles, treated wood products, wood products, rubber and tire fluff.

### **How difficult it is to burn coal in the facility as opposed to natural gas?**

- Currently, Lafarge permitted to burn coal in both Kiln 5 and Kiln 6. Burning coal on Kiln 5 is more maintenance intensive than burning natural gas. Kiln 6 would need to be upgraded to burn coal because it is not currently setup to do so. Lafarge has the equipment required and will install it if coal becomes a more economical option.

### **How can plastic have a lower carbon footprint than natural gas?**

- Different fuels produce different amounts of carbon emissions due to their chemistry. When comparing natural gas to plastics, which are chemically similar, it's also important to consider the life cycle. Natural gas is thought to produce more greenhouse gas emissions from the well and from transportation as compared to lower carbon fuels. This will be assessed during the project and the results will be shared.

### **How come tires are low carbon?**

- Scrap tires contain 15-30 per cent natural rubber, a biogenic material that is carbon neutral. These materials are considered part of nature's carbon cycle; new rubber trees grow and consume the carbon emitted from combustion. A reduction can be seen in the overall carbon footprint when considering the entire life cycle assessment of selected materials compared to traditional fuels (natural gas, coal).

### **How do you process K cups?**

- K Cups processed at our Kamloops facility are shredded, mixed with other fuels (wood mulch) and pneumatically conveyed to the main burner.

### **Interested in the types of LCFs that are being considered, and why those specifically?**

- The fuel categories selected are based on a study of what types of materials are available in Alberta. The fuels chosen are currently in use at other cement plants and are expected to have benign effects on emissions while producing benefits such as lower carbon emissions, less landfilling and new jobs.

### **What residuals do you get when you burn this material?**

- The organic portion of the LCF is destroyed in the kiln. The inorganic residues, which contain metals and other elements, are fully integrated in clinker structure with the exception of volatile metals (Thallium and Mercury) present in fuels and raw materials, which are controlled through kiln dust management and filter temperature.

### **Why are we not doing carbon capture and storage at Exshaw?**

- Lafarge is exploring carbon capture and use and monitoring the research being done by others. Currently the technology is unproven and costly. It remains a future option as development work continues. Lafarge is optimistic that there will become viable options in a three-to-six-year time frame.

### **Why is it called biocoal? Seems like bad marketing?**

- This is the brand name chosen by the third-party company producing the fuel. More can be learned

from their website: <http://www.diacarbon.com/biocoal/>

**Why is it called low carbon when they seem similar to natural gas? What is the difference and how do you compare?**

- Lafarge typically uses the term lower carbon to highlight that the definition is relative to the fossil fuels replaced. If carbon emissions are lower than traditional fossil fuels, it is considered a lower carbon fuel.

**What is the substitution rate?**

- We will aim to use 30-50 per cent lower carbon fuels by 2020. The new Kiln 6 is designed to use up to 80 per cent and Lafarge hopes to achieve this in the future.

**If fuel is only half of the carbon, how will you work towards capturing the rest?**

- Lafarge is exploring a large range of options. Options include low carbon cements, carbon consuming concretes, energy efficiency and working with our customers to use sustainable building solutions.

**Will you still burn coal alongside LCF? Or will you continue to use natural gas?**

- Lafarge is permitted to burn both coal and natural gas and will keep the flexibility to run both.

## Health Impacts

**Does your assessment include health impacts with blood sampling or other health monitoring?**

- Health monitoring is not included in a human health risk assessment (HHRA).

**Has any research been done between environmental cases of chemicals and Parkinson's? How do the regulatory bodies measure potential incidents of disease (e.g. Parkinson's)? Will you look at other non-specific health effects (e.g. runny nose)?**

- The evaluation of specific diseases/health effects and their link to industry is not within the scope of work for an HHRA. The assessment of specific diseases/health effects is conducted by local medical professionals with support from public health officials. As part of their public health surveillance, Alberta Health Services (AHS) monitors (<http://www.albertahealthservices.ca/services/Page13513.aspx>):
  - Detecting potential outbreaks and threats to public health
  - Detecting cases for intervention
  - Monitoring trends in health events
  - Directing public health interventions
  - Guiding decision-making and action to reduce morbidity and mortality and to improve health through an emphasis on primary and secondary prevention
  - Guiding planning, implementation and evaluation of public health programs
  - Providing a basis for epidemiological research.

**What are the health impacts related to the different fuels? Long-term and short-term.**

- The HHRA will outline the nature and magnitude of short-term and long-term health risks from the use of different lower carbon fuels. The assessment will be done for inhalation and exposure through food, water, soil and/or skin. The use of lower carbon fuels is not expected, based on earlier work, to result in any material changes to emissions from the plant.

## Job Creation

### **Would you be able to create jobs in the Bow Valley processing materials?**

- There would be 4 to 8 direct jobs at the Lafarge Exshaw Cement Plant involved in the processing of materials. Jobs will be created at all points in the supply chain from collection, processing, equipment sales and maintenance, contractors, management and construction activities.

## Miscellaneous

### **Something was being assessed in 2009 but thought that the work didn't get completed?**

- This was the alternative fuel initiative for Kiln 5. Lafarge has moved this project to Kiln 6 because it is new, modern and has more technical capabilities to make effective use of lower carbon fuels.

### **Will you be using agricultural plastics?**

- The market study included the plastic generated in the agricultural sector. The current challenges with using agricultural plastic are the handling and logistical costs involved in collecting the material from farms around the province. If the market can support this activity, it will be considered.

### **When will the berm construction be finished?**

- The rebuilding of the berm is an MD issue. The MD is currently in the process of designing the appropriate flood mitigation for the Exshaw Creek. Once they have completed the design they will apply to the Provincial Government for funds to complete flood mitigation. Timing is up to the MD of Bighorn and the Government of Alberta.

### **Why were contours predicted in Lac Des Arcs when the wind doesn't blow there very often?**

- The air dispersion model provides a predicted air pollutant concentration for every hour modelled. Alberta Environment and Parks (AEP) requires that dispersion modelling assessment use five years of meteorological data. Even though there are few winds that would blow emissions directly towards Lac Des Arcs, these hours do exist and the model evaluates potential impact under these rare conditions.

## Modelling

**WSP used emission rates for LCF as determined by Lafarge. How did Lafarge determine these emission rates? Were they based on actual measured data or estimates? Also, please provide the mix of LCF being used (e.g. % shingles vs. railway ties, etc.) and the components of these fuels? Please include in the list, those components of LCF, natural gas and coal that would lead to a potential pollution of concern. We are trying to understand if some fuels are worse than others and also the science behind the emission rates. [WSP Sec 2.1.2 pdf pg 17 and WSP Appendix I, Sec 2.1.1 and Sec. 2.1.1.1, pdf pg 28 of 143, WSP Appendix II, Sec 5.1.1 pdf pg 98]**

- The eventual market mix of fuels available to Lafarge is dependent on future supply and burning conditions. For purposes of estimating fuel tonnes and general mass balances, WSP used 12.5% (1/8) of the eight proposed lower carbon fuels.

**It would seem that for the LCF options, metals were the only pollutants that were adjusted (App 5.1.2 pdf pg 102)? I.e. when substituting LCF for coal, WSP kept SO<sub>2</sub>, NO<sub>X</sub>, PM<sub>2.5</sub>, PM<sub>10</sub> and TSP the same as for coal? Is this correct. If so, this approach is flawed as the emission factors for SO<sub>2</sub>, NO<sub>X</sub>, PM<sub>2.5</sub>, PM<sub>10</sub> and TSP will be different for LCFs than for natural gas or coal. Please comment.**

-

Both WSP and Millenium indicate that there are predicted exceedances of the AAAQO and Concentration Ratios > 1.0 for SO<sub>2</sub>, methyl mercury and a number of particulates. However, these exceedances are dismissed by both WSP and Millenium because of the conservative nature of the modelling. We have read the list of reasons for the conservatism (WSP Sec 3.1 pdf pg 20); however, we have also read that there is a match between the modelled results and the measured ground level concentrations (WSP App II, Sec 6.3.1.2 Fig II-17 pdf pg 126 and App II Sec 6.3.2 pdf pg 128). If the modeling is so conservative, as claimed, one would expect the model results to be much greater than the actual ground level measurements. But this is not the case, so we question whether the modelling is actually as conservative as WSP indicates. It is also worth noting that we are often asked to ignore modelled exceedances because of conservative modelling; however, the fact remains that actual ground level exceedances have historically occurred. Could you have WSP comment on whether the model results are truly as conservative as they say and if not, are there any changes to the HHRA conclusions?

- WSP's emissions estimation, modelling assumptions and modelling approach were selected to yield conservative predictions of potential air quality impacts. The maximum predictions of the model are conservative in comparison to the monitored SO<sub>2</sub> and PM<sub>2.5</sub> data. Extreme events are the exception, primarily wildfires that are not included in the modelling, but have caused exceedances of PM<sub>2.5</sub> in the airshed. The conclusions of the report do not dismiss the modelling results as conservative. The conclusions state that the modelling assessment has identified SO<sub>2</sub> and TSP as having the potential to exceed short-term Ambient Air Quality Objectives. The SO<sub>2</sub> and TSP concentrations experienced in Exshaw are not anticipated to be impacted by the LCF fuel switch. The report recommends continued management of these pollutants and that air quality monitors in the airshed should act as tools to evaluate the effectiveness of the management of SO<sub>2</sub> and particulate matter concentrations in the airshed moving forward.

**Appendix II, pg 98 indicates that literature data was used for cement dust. Why not use actual data for the fuels being proposed and actual cement dust?**

- It is common practice for emission estimation and dispersion modelling to utilize the speciation profiles from the US EPA SPECIATE database to characterize the many species of pollutants evaluated in the model. An established record of actual speciated data was not available for Kiln 6 emissions (the emissions that have the potential to change resulting from the introduction of LCF fuels) so the established database records were used to speciate. Kiln specific speciation data for the proposed LCF fuels was not available (this data will be collected moving forward as part of the partner studies), so this information was based off of available information from Lafarge.

**WSP did not include fugitive dust from the shoreline of Lac Des Arcs or when low water levels occur in Lac Des Arcs. These fugitive dusts could be significant. Should they also be included? [WSP Appendix I, 2.2.8, pdf pg 50 of 143]**

- The same emission sources and methodologies from the 2009 assessment were employed in the current assessment. The 2009 assessment did not quantify potential emissions from Lac Des Arcs. The emissions estimation methodology requires detailed information on soil/surface characteristics and exposed lake bed levels. Even with that information, the emission estimate techniques would have considerable uncertainty. The inclusion or exclusion of this potential source of fugitive dust would not alter the predicted change in impacts due to the introduction of LCF fuels. The source would have the same potential to impact with or without the introduction of LCF fuels.

**Emissions for unpaved road looks very high considering that we don't have many unpaved public roads (Table I-13)?**

- Table I-13 provides the estimate of unpaved road emissions to the airshed based on a top-down apportionment of the 2005 emissions inventory for Bighorn MD (the last specific information available

through Environment Canada). Area source fugitive dust emission estimates associated with unpaved roads can have a considerable amount of uncertainty. Therefore, as with the 2009 assessment, the estimated contribution from the non-modelled sources (Appendix II, section 4.2) did not include unpaved road dust from area roads. The modelling did include unpaved road dust contributions from the Lafarge Exshaw facility.

**Are the results specific to Exshaw/AB? Do they consider local ecosystem, weather, elevation?**

- Yes. The model considers local meteorology, terrain, land use and land cover (vegetation, infrastructure, water, soil, etc.).

**Are you looking at only Particulate Matter (PM) or other pollutants?**

- Air Dispersion Modelling considers PM and up to 90 other pollutants.

**Are you using the most conservative air emissions data?**

- The most conservative air emissions data from testing at other Lafarge facilities is being used.

**How many point sources are there for your models?**

- The model considers 11 point sources (stack emissions) and other area sources for Lafarge emissions. It also considers point source emissions from Baymag and Graymont facilities.

**What are the details of the air modelling?**

- The details are outlined in the report which will be made available to stakeholders. The model will follow the Alberta Environment and Parks Air Quality Modelling Guideline. It will consider local meteorological (weather) data, the shape of the local terrain, land use and land cover data. Emissions from Lafarge, Baymag and Graymont will be included. These predictions will be compared to the Alberta Ambient Air Quality Objectives to identify any concerns. They will be used in the human health risk assessment.

**What has changed in the modelling?**

- Air Dispersion Modelling conducted for the 2009 HHRA has been updated. Although the same regulatory model will be used, Alberta Environment and Parks has since published a new version of the Alberta Air Quality Model Guideline. The new guideline stipulates that the model must be updated to include new meteorology, new background air quality information based on the monitoring conducted by Lafarge since the last assessment and updated emissions information from Lafarge, Baymag and Graymont.

**What is the baseline for the life cycle analysis?**

- A Life Cycle Analysis (LCA) is the most comprehensive means of evaluating various fuels. It allows you to compare emissions from collection, processing, transportation and use. Asphalt shingles can be compared side-by-side with a baseline set by natural gas. An additional comparison can be made to the landfilling or incineration of shingles.

**What is the difference between monitoring and modelling? Could you clarify?**

- Modelling tries to predict the potential impacts to air quality, while monitoring measures the actual impact to air quality at a representative location. In the case of the LCF assessment, Lafarge will predict the potential changes to air quality from changes at the plant with a model and then continue to monitor the community air quality resulting from all activities in the community and beyond.

### **What was flagged previously between pre-construction and now?**

- The primary pollutants of concern identified from the previous modelling assessment were particulate matter and sulphur dioxide (SO<sub>2</sub>). Since that time, Lafarge has implemented measures to control fugitive dust and reduce SO<sub>2</sub> emissions.

### **Will it consider surrounding input like traffic and transportation?**

- The HHRA evaluates emissions from Lafarge, Baymag, Graymont and non-industrial emissions from traffic and other local sources.

### **How will you look at reducing truck traffic?**

- Lafarge has contracted a third-party environmental consultant, WSP, to analyze traffic impacts. The project will be looking at current traffic volumes, traffic anticipated in the first phase of the project and then at full-scale operation.

## **Air Monitoring**

### **How many air monitoring locations are there?**

- There is one air monitor compliant with provincial government regulations located at the lagoon in Exshaw. Lafarge has added a second location for ambient air sampling of PM near the WindRidge area of Exshaw. There are two industrial air monitors east of the plant, within the fence line. A background monitor is located east of Grotto Pond.

## **Odor**

### **Does carpet smell when burnt?**

- Carpet and all other fuels to be used in the project are combusted at high temperatures with well controlled, highly efficient combustion system. Smoke and other related odours result from poorly controlled systems, such as open burning.

## **Other Case Studies**

### **Has the LCF switch happened anywhere else in Canada? For what fuels? What is the history for other LCF switches? How did it do?**

- Lafarge is involved in several research and development programs to convert Canadian cement plants from fossil fuels to lower carbon fuels. Some plants have been using lower carbon fuels for over a decade. The best data is from recent independently funded work at both the Bath, Ontario plant and the Brookfield, Nova Scotia plant. Results consistently show insignificant changes in emissions coinciding with significant reductions in carbon emissions for every tonne of fossil fuel replaced. Fuels tested (with results published) include: railway ties; plastics; shingles; and construction, renovation, and demolition (CRD) materials. Preliminary results for non-recyclable packaging, textiles, and industrial composite materials show similar results, but the final reports have not been published. Scrap tires, tire fluff, and other materials being proposed for Exshaw are all in use in Canadian cement plants -- and worldwide -- and results are routinely within compliance of environmental and safety standards. While lab testing, modelling and results from other plants are all showing positive results, the research team is planning extensive third-party testing and results will be shared prior to moving to permanent use.

### **Where do you process this material elsewhere in Canada?**

- British Columbia: treated wood chips, K-Cups, non-recyclable rubber, non-recyclable plastics, construction and demolition waste, railway ties, wood fines, tire fluff, carpet
- Alberta: studies underway.

- Ontario: wood waste, virgin biomass, railway ties, construction and demolition waste, asphalt shingles, non-recyclable, packaging, manufacturing, composites, K-Cups, carpets and textiles, non-recyclable plastics and rubber, used oil and solvents.
- Quebec: used tires, construction and demolition waste, shingles
- Nova Scotia: asphalt shingles, non-recyclable plastics.

## Recycling

### **Why can't the plastic be recycled? Can they not take it and reuse it?**

- Many plastics are collected and recycled with great efficiency. However, some plastics are comprised of mixed materials that are not economically recyclable. Other plastics are not recycled due to market limitations or other technical and economic factors. Landfill bound plastics are the target fuel supply stream for the Exshaw plant. There are studies that show that the introduction of fuel use to the suite of waste management solutions available supports recycling:  
[http://www.seas.columbia.edu/earth/wtert/sofos/Covanta\\_CSR\\_2011.pdf](http://www.seas.columbia.edu/earth/wtert/sofos/Covanta_CSR_2011.pdf)
- An additional factor that generates non-recyclable plastics is contamination of plastic. Recyclers need to meet strict quality standards for resale. Plastic that gets imbedded with sand or glass from collection cannot be used and is rejected. Material that cannot be recycled is typically landfilled. For many materials, there is simply no demand for reuse when they reach end of life.

## Regulatory

### **What is the government's role in all of this? What is the AB Government's role? Why are they not currently listed as a partner?**

- Alberta Environment and Parks' (AEP) role is to act independently on behalf of the citizens of Alberta. Their experts apply standards and engineering judgment in reviewing applications for approvals and ensuring compliance with regulations, emission standards and other similar requirements. The review will address design plans, site suitability, proposed monitoring programs and methods of minimizing the generation, use and release of substances. AEP has been attending the Project Advisory Committees as an observer. AEP is also implementing a Carbon Plan to encourage industry transition to lower carbon technologies. Two Alberta-based agencies, Emissions Reduction Alberta and Alberta Innovates, along with matching funds from the Ontario Centres of Excellence, are providing funds to foster low carbon fuel research in Canada. The research is being carried out by University of Calgary and Queen's University researchers along with experts from Pembina.

### **Please confirm that this application is not a permit renewal. We ask because Alberta Government has made a major commitment to phase out coal-fired power generation and we expect Lafarge will make a similar commitment with their renewal in 2019?**

- The Application for the Amendment of Approval 1702-02-00 for the Introduction of Low Carbon Fuels (LCF) at the Lafarge Exshaw Cement Plant is not an Approval renewal. It is a request to amend Approval 1702-02-00 to introduce LCF at the Exshaw Plant.

## Relevance of Modelling with Time

### **As the LCF sourcing evolves over time, we need to be able to update the models and check the actual air emissions. Maybe checking every 2 years?**

- As new fuels are sourced/proposed, Lafarge would follow the AEP amendment process.

### **How do you know how things will change in the future? How does the modelling take this into**

## account?”

- Lafarge has consolidated the results of emissions testing at several facilities in Canada and the United States to inform the potential changes to emissions from the use of lower carbon fuels. The modelling and HHRA will compare the air quality changes, on a worst-case basis, from these emissions to the emissions currently being released from the facility. Any predicted effects will be validated by third-party emission testing and the results will be shared with the community.

## Sampling

### **Do you do any actual sampling to see if your predicted risks are accurate?**

- Yes. Lafarge currently operates the Lagoon Air Quality Monitoring Station that samples the air for concentrations of particulate matter (PM), Sulphur dioxide (SO<sub>2</sub>) and Nitrogen Dioxide (NO<sub>2</sub>). Lafarge has added a second location for ambient air sampling of PM near the WindRidge area of Exshaw. Lafarge operates three other monitors near the site to inform fugitive dust management. The second form of sampling is emission testing. These predictions will be validated by third-party testing and the results will be shared with the community.

## Sourcing

### **Are you working with landfills to source LCF? Where does the LCF come from?**

- LCF can come from various sorting and recycling facilities (commercial and municipal) handling common wastes such as: shingles, construction wastes, paper products, containers and packaging. Lafarge works with these businesses to develop fuel that meets the specifications from material destined for the landfill. Other sources may include industrial, commercial, and institutional facilities -- additional fuel processing may be necessary to convert raw fuel materials into a LCF used at the plant.

### **How are you going to source all of the material that will be needed?**

- Lafarge has a dedicated commercial company, Geocycle Canada, that works directly with the industry and community to qualify, develop and commercialize waste by-products into alternative fuel. Lafarge understands it needs to be actively involved in development of the lower carbon fuel supply chain to source the amount of fuel that will be needed to meet targets. This industry will not develop overnight. If there is an end market, such as Lafarge Exshaw, the industry will invest and hire more workers to meet the upcoming demand.

### **Where do the potential fuels come from? Canada or only AB?**

- Lower carbon fuels are typically sourced within a 300-kilometre radius from cement plants to keep transport costs low. Due to this economic reality, Lafarge expects most of the fuels to come from Alberta with some sourced from other areas in Western Canada and the northwest region of North America.

## Storage

### **Are all fuels going to be stored in the hall?**

- Yes. Lower carbon fuels will be stored in an enclosed storage hall.

### **Could you use a quarried area to store the fuel and then move it to storage or the kiln?**

- No. The quarry is not permitted to store fuels.

### **Do they have to store LCF on site? Does it have to be covered?**

- Design standards dictate that the LCF must be covered and design for the low carbon fuel system includes an enclosed storage hall. Consistent fuel supply is necessary for efficient plant operations and interruptions in supply are best addressed by onsite storage.

### **If there is a fire at the storage area close to the river, the water used to put out the fire would overflow into the river. Berms to hold water? Could the ground be more porous to absorb the water?**

- Suitable engineering measures will be taken so that rain water, firefighting residual water and spilled material can be captured. A reception system will be in place to collect the residual firefighting water, rain water and spilled material. Lafarge cannot provide the exact specifics on water capture until detailed engineering work is completed. One alternative is to use foam as a fire suppressant.

### **How will shredded creosote rail ties be stored?**

- Shredded creosote rail ties will be stored in the enclosed storage hall and will present no negative effects on the immediate surroundings.

### **Why not store fuels at Seebe or other quarry?**

- Storing alternative fuels offsite at Seebe would result in increased traffic, poor reliability and higher costs as trucks would need to continually shuttle back and forth from the plant to deliver fuel.

## **Timing**

### **What is the timeline for the project?"**

- Lafarge will continue to update stakeholders on the timeline for this project as it evolves:
  - Air Model Update (WSP) – Anticipated completion: March 24
  - HHRA Update (Millennium) – Anticipated completion: April 24 to May 5
  - Open House #2 – Late June
  - Permit Submission to AEP/MD - October 2017
  - Anticipated Permit Approval - Q4 2017
  - Engineering and Construction - Q1 2018 through Q2 2019

### **What is the research partner timing vs. the permit timing? Will the permit be done before the research?**

- There are many aspects of the research program being funded that can proceed without a permit from Alberta Environment and Parks (AEP). However, a central feature of the program is the before and after emission testing of the various fuels in the Exshaw kiln and this part will occur in later phases of the program and only if approval is provided.

## **Transparency**

### **Will Lafarge smooth over the effects of the LCF Study?**

- No. Lafarge is only one partner in the study but will actively participate in ongoing research, including contribution of expertise and other resources. The testing results will be carried out by third parties and reviewed by all project partners independently. Results and interpretation will be primarily the role of the academic research teams with advice and information provided from all research partners.

**Would the risk assessors suppress the results since they are working with Lafarge?**

- No. HHRA is a scientific study that is undertaken by subject area experts. The scientists belong to professional organizations and must uphold the professional standards of those organizations. If they do not, they risk losing their professional designations and their reputations and may not be able to practice in their profession. As an added check, the HHRA will be submitted to Alberta Environment and Parks (AEP) and Alberta Health (AH) who independently review the report.

**How much data/research will be made available before the permit application and during the course of the two-year research project, if approved?**

- The research team is committed to sharing information as it becomes available. Significant previous research reports are available on websites today including [www.cement2020.org](http://www.cement2020.org) and <http://www.lafargebrookfield.ca/>. In addition, the Exshaw project includes a Project Advisory Committee to further ensure that data is shared in a meaningful way.

**Will the report be published? Will it be in the library?**

- Yes. A copy of the final report will be made available at the Exshaw Library.