

Welcome to Public Meeting #1

Alternative Low Carbon Fuel Use  
at  
St Marys Cement  
Bowmanville Plant

September 5, 2019



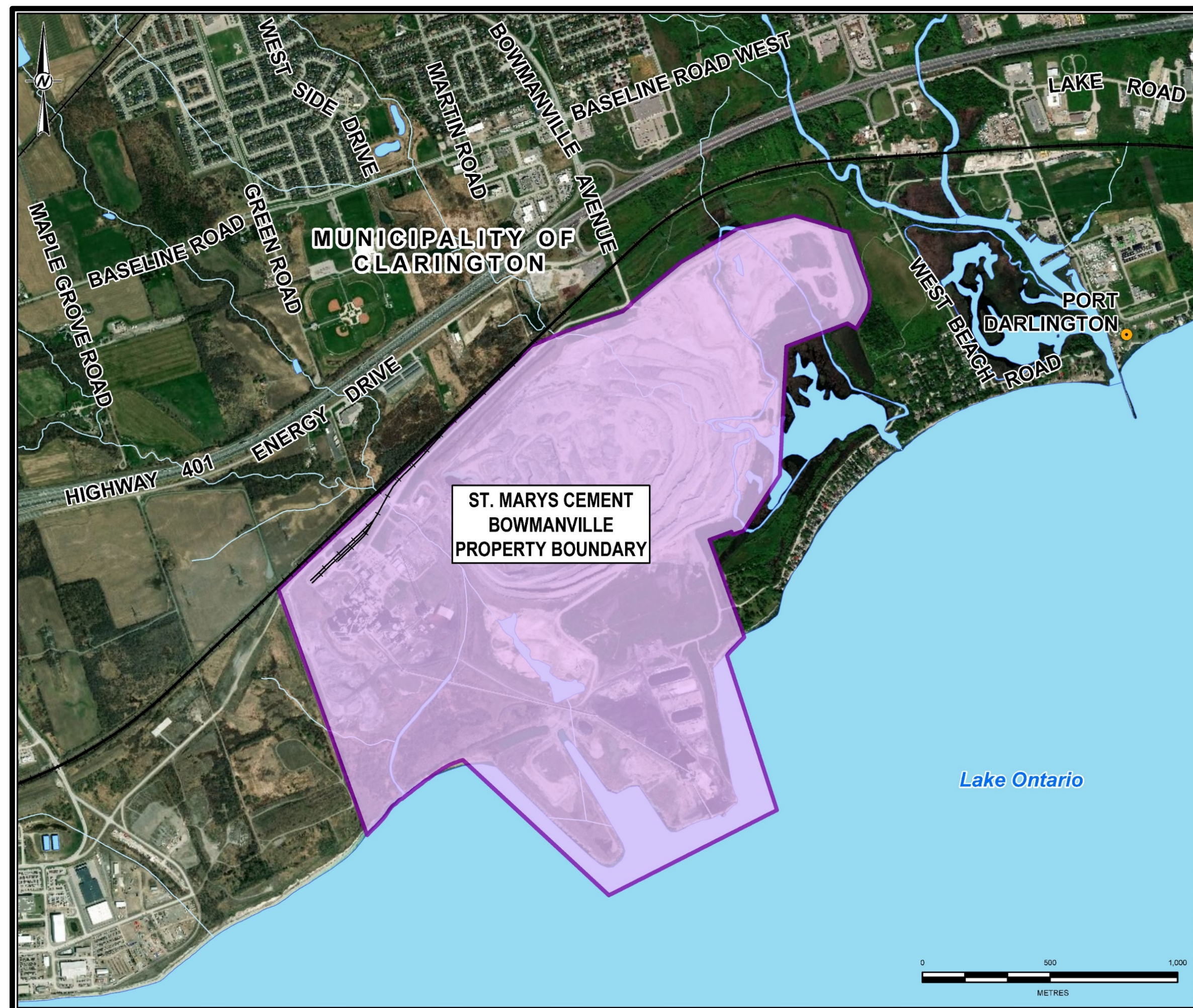
# Overview of Public Meeting #1



- St Marys Cement (SMC) a company of Votorantim Cimentos North America (VCNA) is undertaking efforts to use Alternative Low Carbon Fuels (ALCFs) as an energy source for their Bowmanville Cement Plant
- Today our Project Team is here to answer the following questions and hear your feedback:
  - **Overview of the St Marys Cement Bowmanville Plant (SMCB)**
    - What are the important characteristics / facts of SMCB operation?
    - How is cement made?
    - What are Alternative Low Carbon Fuels (ALCF)?
  - **Overview of the Demonstration Project and results**
    - What is the Demonstration Project and why was it conducted?
    - What are the results of the Demonstration Project?
  - **Overview of the current project and proposed application under Ontario Regulation (O. Reg) 79/15**
    - What SMCB is proposing and why?
    - How is SMCB considering the environment in this project?
    - How is this study being conducted?
    - What is the timeline for this project?
    - How can you participate in this project?

## Site Overview

- St Marys Cement Bowmanville Plant (SMCB) is located at 410 Bowmanville Avenue, in Bowmanville, Ontario, within the Municipality of Clarington
- SMCB extracts limestone at the site, produces clinker and cement for the Ontario market and also exports to the US
- The cement produced at the plant contributes to building infrastructure (e.g. roads, bridges, buildings) across Ontario and North America:
  - Examples of projects include the CN Tower, Darlington Nuclear Station and Toronto-York Spadina Subway Extension



## Site Facts

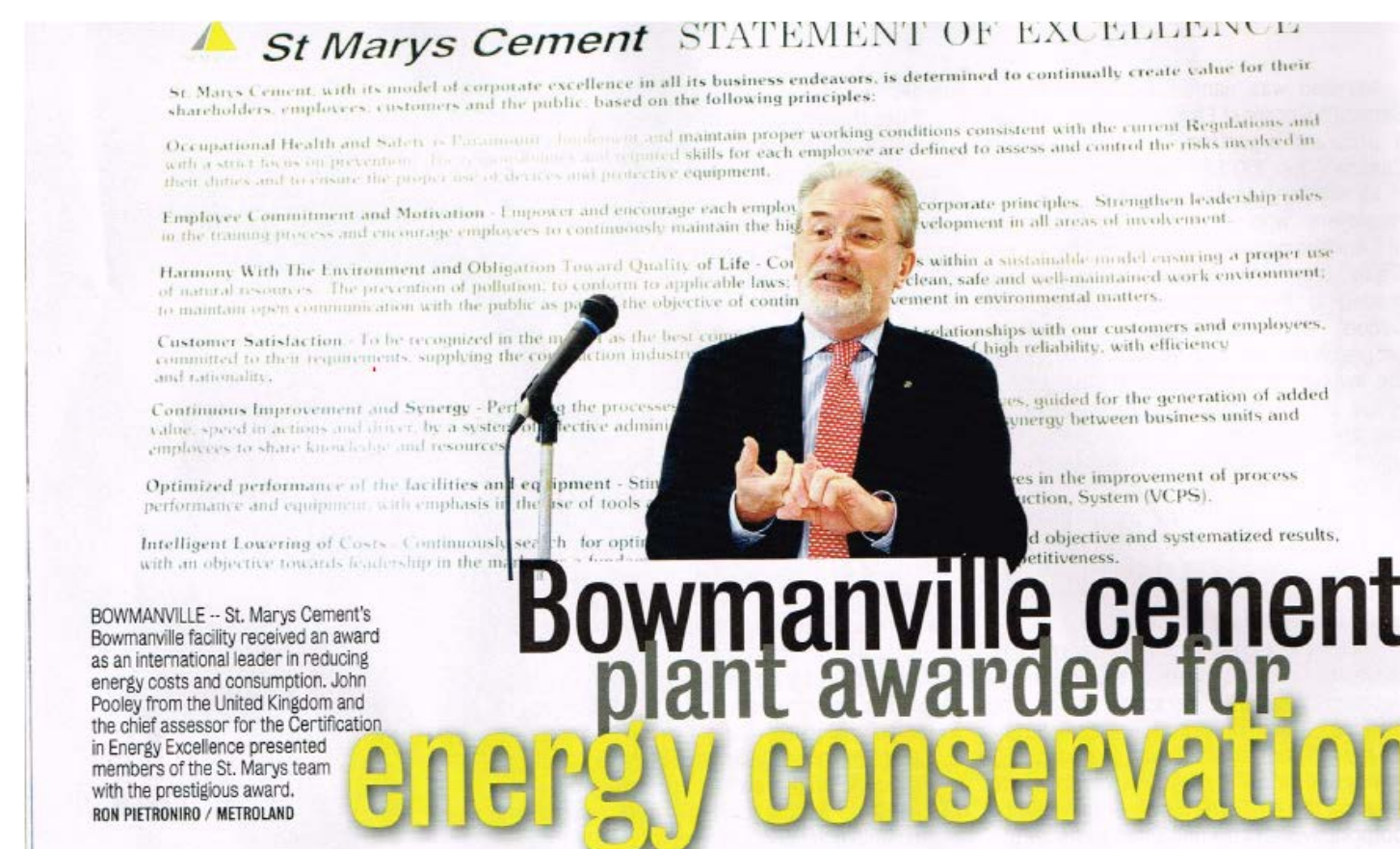
- Started operations over 50 years ago in 1968
- Upgraded in 1988 to modernize the plant to state of the art technology; dry process and preheater/precalciner kiln
- Current clinker capacity: 1,800,000 tonnes per year
- Current cement capacity: 1,250,000 tonnes per year
- Produces four types of cement:
  - General Use Type GU Cement
  - Contempra Type GUL Portland Limestone Cement
  - ASTM General Use Type I Cement
  - ASSTM General Use Type III Cement

## How does SMC participate in your community?

- **The site contributes to local jobs employing:**
  - 132 plant employees
  - 9 CBM Aggregates (a company of Votorantim Cimentos North America) employees
  - 11 dock employees
- **SMCB contributes to the local economy by working with numerous suppliers and contractors and creating in-direct jobs (e.g. truck drivers, electricians, millwrights, skill professionals)**
- **SMCB participates in local initiatives such as:**
  - Community Relations Committee
  - Clarington Board of Trade
  - Hospital Foundation
  - Partner with local schools
  - Clarington Family Safety Day
  - Take your Kid to Work Day
  - LAV Monument
  - Bowmanville fish ladder
  - Outdoor Classrooms



# St Marys Cement Bowmanville Plant- Awards



## Certifications and Awards

- Winner Laureat of the CIPEC Leadership Award in 2018
- Recertification in 2017 in ISO 50001
- 2017 Insight Award for Energy Management
- Certification in Energy Excellence - Gold in 2013
- First recipient of ISO 50001 certification in North America - 2011
- Certification in Energy Excellence - Silver in 2010
- PCA Chairman's Performance Safety Award 2008
- PCA Environmental Award 2006, 2008
- PCA Energy Conservation Award 2008
- OSHAS 18001 certified since 2007
- ISO 14001 certified since 2006
- ISO 9001 certified since 1996



## Why is the cement industry important for Ontario?

- **The cement industry is a vital participant in Ontario's economy**
  - **54,000** direct and indirect jobs across Ontario
  - Generates over **\$25 billion** in direct, indirect and induced economic activity
- **Six Cement Plants across Ontario**
  - St Marys Cement (St Marys, Bowmanville)
  - Lafarge (Bath)
  - Lehigh (Picton)
  - CRH (Mississauga)
  - Federal White (Woodstock)
- **Concrete operations across Ontario**
  - **285** ready mixed concrete plants
  - **20** precast concrete plants
  - **11** concrete pipe plants
- **Industry's priorities:**
  - Deliver solutions that stimulate the economy, create jobs and protect taxpayer investment
  - Innovation to enhance competitiveness and attract Ontario investment
  - Protect the environment for future generations by embracing innovation and focusing on initiatives that deliver results and build climate-resilient communities

### 1 cubic metre

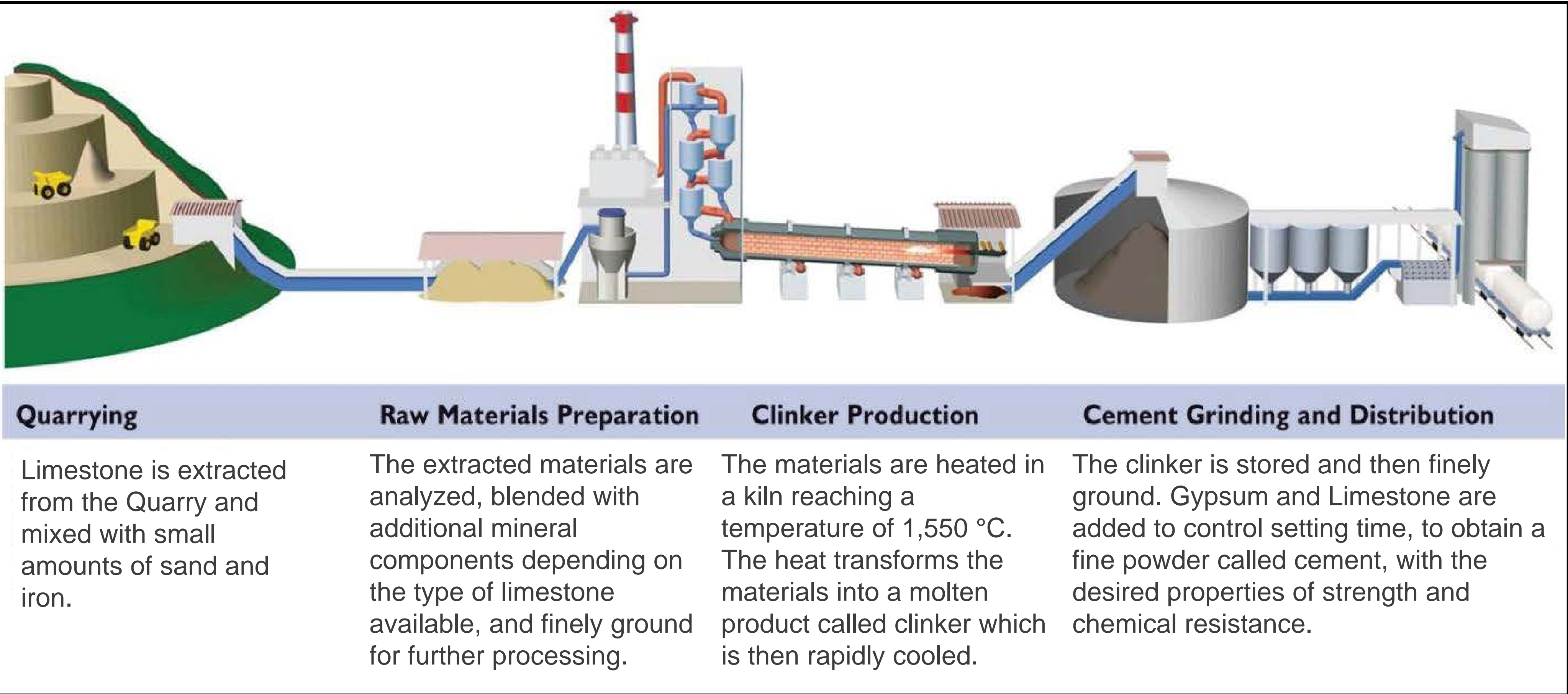
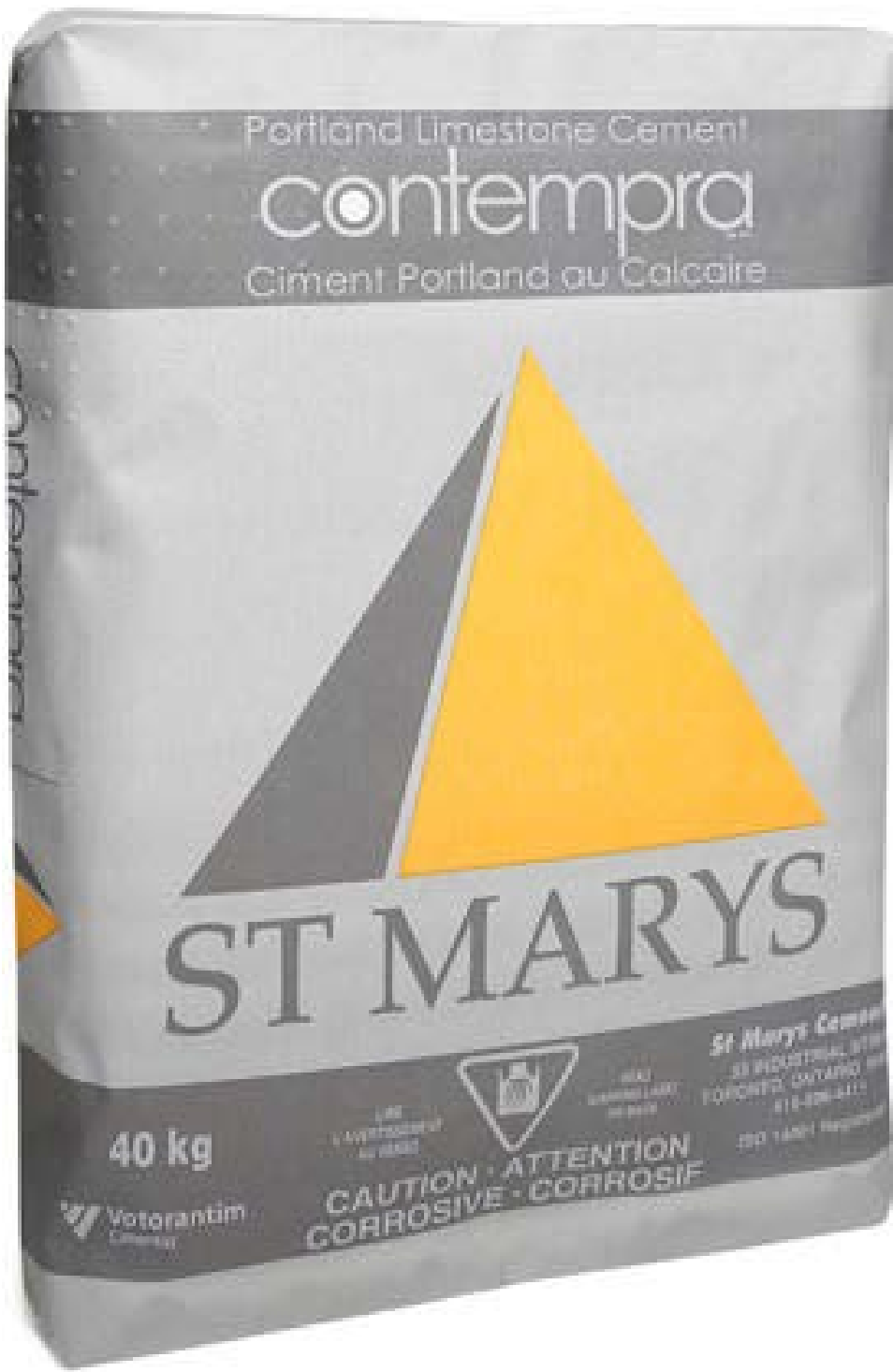
**Estimated amount of concrete per Canadian used per year** to build our homes, office towers and public spaces; pave our roads, highways, sidewalks and parking lots; construct sewers and water treatment facilities; build our bridges, ports, airports, dams, power plants and oil wells.

Source: Cement Association of Canada (2019)

**Concrete** is the second substance used most in the world after water

## How is Cement Made?

- At the Site, SMC produces Portland cements
  - Limestone that contains calcium carbonate is combined with other materials such as silica and iron oxides to provide the right chemistry then is heated to extremely high temperatures as high as 1,550 °C to produce clinker
  - The clinker is then ground with finishing materials such as gypsum and limestone to produce cement
- Portland cement is the binding ingredient to produce concrete when mixed with water and aggregates
- Concrete is widely used as a building material for structures and pavement.



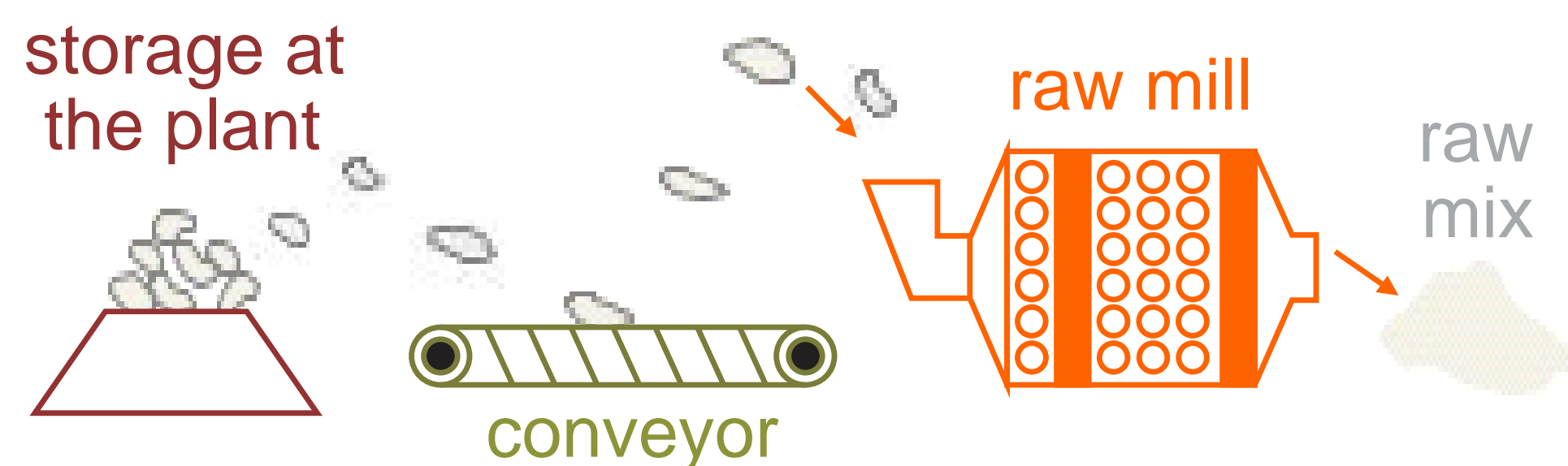
### Portland-Limestone Cement

- Portland-Limestone Cement (PLC) or Contempra is a lower carbon intensity cement that reduces embodied greenhouse gases in concrete by 10%
- Produces concrete with the same strength, durability and performance

## How is Cement Made?

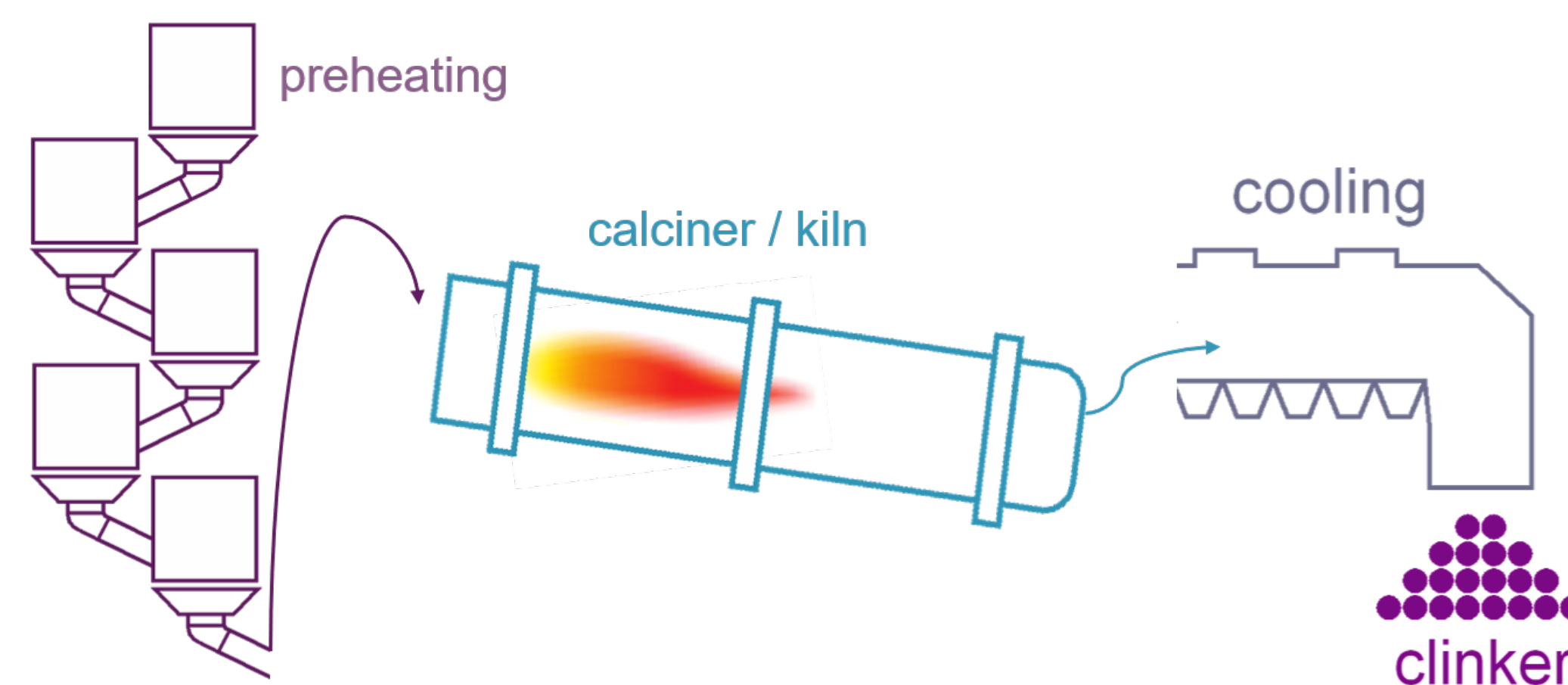
### Raw Material Processing

- Limestone is blasted in the quarry
- Limestone is combined with other raw materials to get the chemical composition required for clinker production
- Fuel and raw material analysis are performed to verify that they meet quality production requirements



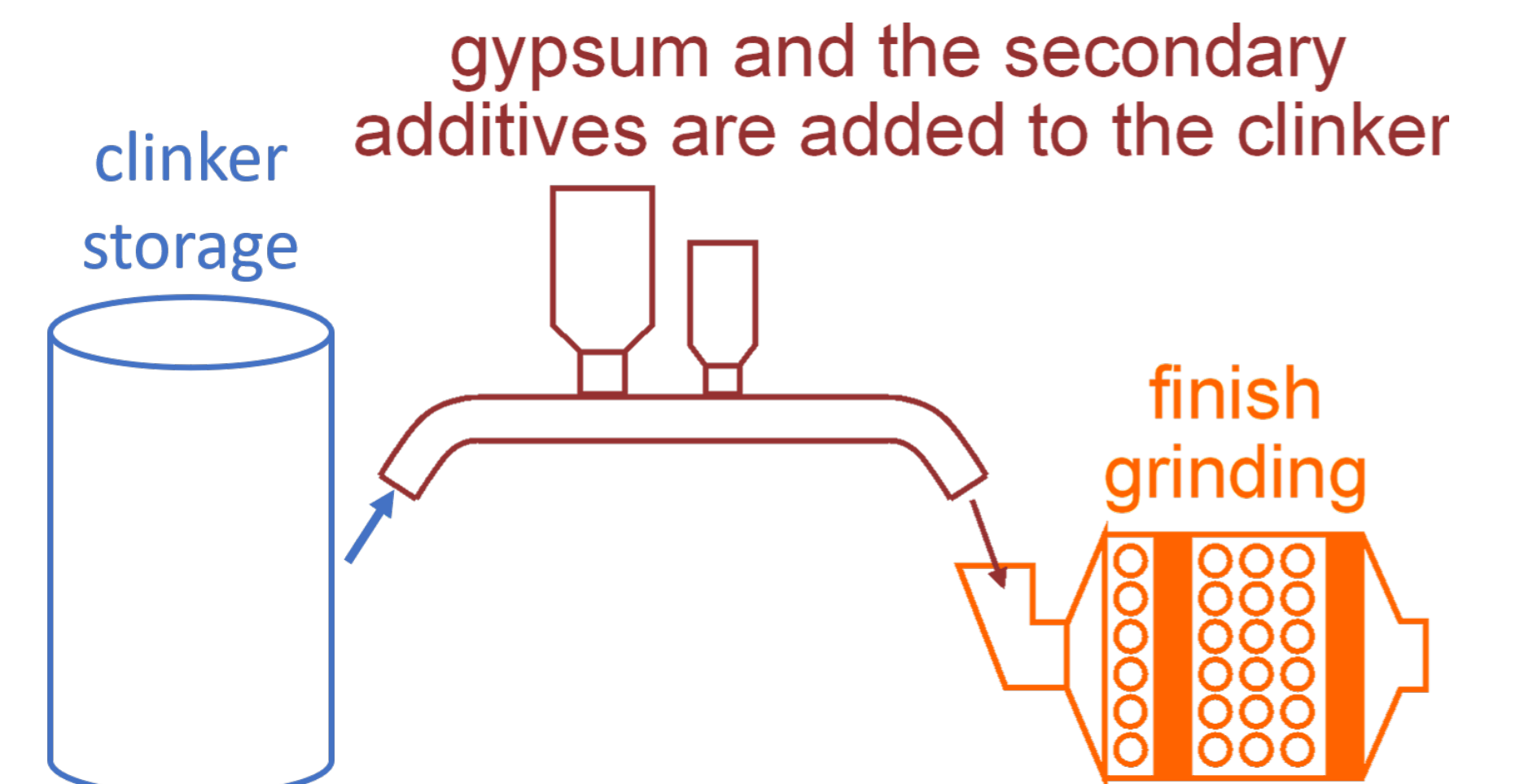
### Clinker Process

- The mix of raw materials and the gases of combustion go through the process in a counter-flow system.
- The mix of raw material goes through the raw mill and preheater tower into a rotary kiln which transforms the mixture into clinker.
- The gases of combustion flow from the rotatory kiln to the preheater tower and raw mill.
- The counter-flow system promotes energy efficiency and reduces some air emissions by “scrubbing effect” of the raw feed
- The primary reaction in the rotary kiln is the conversion of calcium carbonate ( $\text{CaCO}_3$ ) to Calcium Oxide ( $\text{CaO}$ ) under very high temperatures ( $1,550^\circ\text{C}$ )



### Clinker to Cement

- The clinker is cooled and combined with gypsum and limestone in grinding mills to make cement
- SMC manufactures 4 different types of cement, which a range of strengths and set times
- Cement is shipped in bulk by truck, rail and boat to different market locations



## What is an Alternative Low Carbon Fuel (ALCF)?

ALCFs are fuels that have a carbon dioxide emission intensity, which is less than coal or petroleum coke when combusted, and meet one of the two following descriptions:

1. The fuel:
  - Must not be considered hazardous and must not be derived from animals or the processing and preparation of food
  - Must be wholly derived from (or composed of) materials that are biomass or municipal waste or a combination of both, and
  - Must have a high heat value of at least 10,000 megajoules per tonne if it is not derived from or composed of materials that are solid biomass.
2. The fuel must be derived from or composed of organic matter, (not including peat or peat derivatives), derived from a plant or micro-organism and grown or harvested for the purpose of being used as a fuel



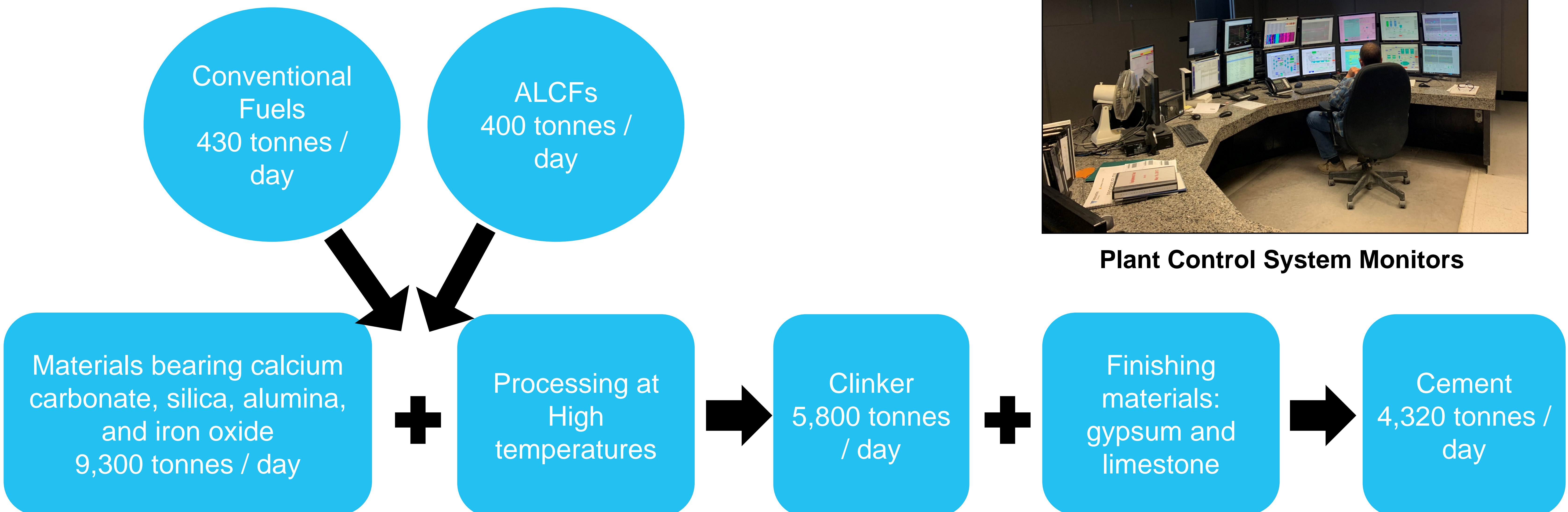
**ALCF materials on conveyor belt**

## How are ALCFs used in the production process?

- SMC currently primarily uses a combination of conventional fuels (coal and petroleum coke) at the Site along with a limited amount of alternative fuels (i.e. woody biomass consisting primarily of wood chips) per their Environmental Compliance Approvals.
- The ALCF is introduced into a solid fuel delivery system, which would feed directly into the calciner, operating at extremely high temperatures along with conventional fuels
- The fuel delivery system is interlocked with the plant control system. The operator is able to set the feed rate for the alternative fuel, based on the system's performance
- Alternative Fuels will not be used during the start-up and shut-down of the kiln



**Plant Control System Monitors**



## Alternative Low Carbon Fuels Around the World

- There has been a long history of alternative fuels used in cement production around the world
  - In 2011, Canadian cement producers derived on average 10% of thermal energy for production from alternative fuels, compared to global average of 13%. <sup>1</sup>
    - By comparison, cement producers in the European Union derived on average 34% of thermal energy from alternative fuels, with rates as high as 66% in Austria, and 62% in Germany <sup>1</sup>.
    - The United States average was 16% <sup>1</sup>.
  - Within Canada, Quebec has the most experience with using alternative fuels in cement manufacturing, having achieved fuel substitution rates of more than 30% over the last 25 years <sup>1</sup>.
- The European Cement Association estimates that by 2050, 40% of kiln energy could potentially come from traditional sources (e.g., coal and petroleum coke), while 60% of kiln energy could potentially be provided by alternative fuels of which 40% could be biomass. The fuel mix would lead to an overall decrease of 27% in fuel CO<sub>2</sub> emissions <sup>3</sup>.

1. The Pembina Institute and Environmental Defence. *Alternative Fuel Use in Cement Manufacturing. Implications, Opportunities and barriers in Ontario*, 2014.

2. Hasanbeigi et al., *International Best Practices for Pre-Processing and Co-Processing* 2012.

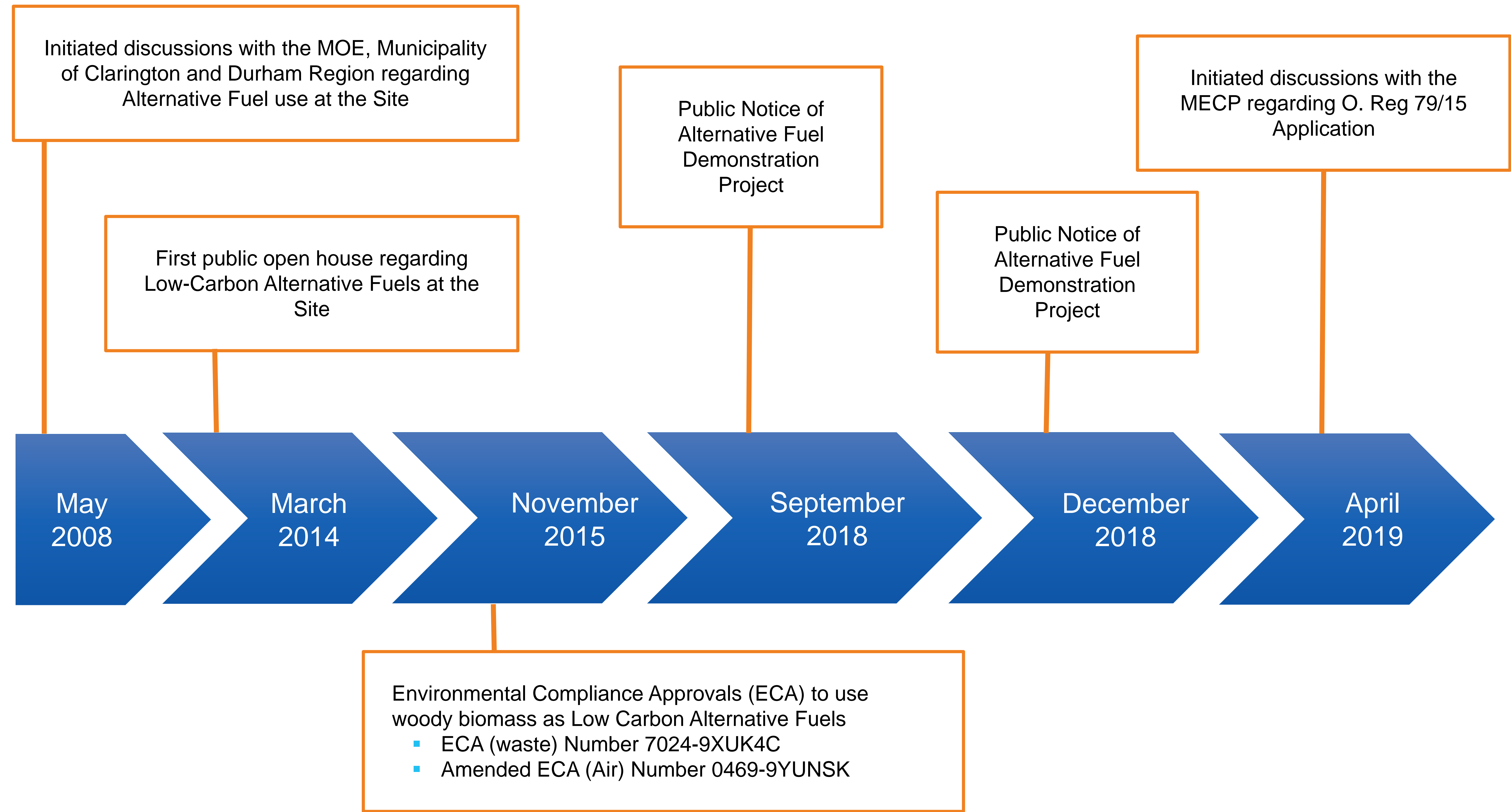
3. CEMBUREAU, The European Cement Association. *Alternative Fuels*. 2018. <https://lowcarboneconomy.cembureau.eu/5-parallel-routes/resource-efficiency/alternative-fuels/>

## What approvals does SMCB currently have?

- In 2015, SMCB started using woody materials as an Alternative Low Carbon Fuels to replace approximately 8% of their conventional fuels (by weight) under their Environmental Compliance Approvals (ECA) Number 7024-9XUK4C and Number 0469-9YUNKSK
- From September 2018 to December 2018, SMCB carried out a demonstration project to use residuals derived from industrial and/or post-consumer sources including plastic polymers, paper fibres and woody materials as ALCFs at the Site under their ECA Number 1255-7QVJ2N and Number 4614-826K9W



## Timeline of ALCFs at the Site



## What is the Demonstration Project?

A demonstration trial is a time-limited testing/monitoring program to collect data during the use of a proposed ALCFs.

The program must:

- Confirm that specific Operating Limits and Performance Objectives can be met;
- Confirm that Regulation 419/05 Schedule 3 standards at the maximum Point-Of-Impingement (POI) can be met using the results of the source testing program and air dispersion calculations;
- Assess any statistically significant changes in emissions from the cement kiln stack and POI concentrations of the test contaminants resulting from the use of alternative fuel, if any, relative to the baseline conditions; and
- Assess any statistically significant changes in ambient air concentrations resulting from the use of alternative fuel, if any, relative to the baseline conditions.

## Why was the Demonstration Project Conducted?

A demonstration trial was recently conducted to show that:

- from an operational perspective, SMC can successfully utilize alternative fuels as defined in their ECAs to offset a portion of conventional fuel; and
- from an environmental perspective, SMC can meet all air quality standards and demonstrate that there is no statistically significant change in local air quality.

## What were the results of the Demonstration Project?

- The allowable maximum alternative fuel consumption rate of approximately 30% thermal replacement can be readily achieved from an operational perspective
- SMCB fully complied with their Operational Limits, their Performance Objectives, and with Regulation 419 while demonstrating any amount of alternative fuel
- The data obtained from the source testing program demonstrated that relative to baseline conditions, there was no statistically significant difference in kiln stack emissions and POI concentrations of all contaminants as a result of the use of alternative fuel
- The data obtained from the ambient monitoring program demonstrated that there was no statistically significant difference in ambient air concentrations of any contaminant as a result of the use of alternative fuel, relative to baseline conditions
- The demonstration project provides an extensive Ministry validated/reviewed data set to be used in the environmental studies to support the application for regular use of ALCF.

## What is SMC Proposing?

- As part of SMC strategy to reduce GHGs and in keeping with best practices implemented around the world, SMC has initiated a study to support the preparation of an ALCF Application under Ontario Regulation (O. Reg) 79/15 of the *Environmental Protection Act* to expand the current use of ALCF
- SMCB is proposing to:
  - Increase the daily throughput of ALCFs at the Site from 96 tonnes per day (approximately 5 trucks) to 400 tonnes per day (approximately 20 trucks)
  - Add biomass, cellulosic and plastic materials from the recent demonstration project at the Site to their approved list of ALCFs at the Site with the intention to substitute conventional fuels (coal and petroleum coke) to approximately 30% thermal replacement. These materials:
    - Are derived from industrial and/or post-consumer sources
    - Cannot be recycled
    - Are not hazardous
    - Are not derived from animals
    - Are not derived from the processing and preparations of food,
  - Install new equipment to feed ALCFs
  - Increase alternative fuels storage using enclosed containers and buildings



**Enclosed ALCF Storage Container and Building**

## What is Ontario Regulation (O. Reg) 79/15, Alternative Low Carbon Fuels?

- O. Reg 79/15, Alternative Low Carbon Fuels, came into force as of May 1, 2015 under the *Environmental Protection Act*
- The Ontario Government put this regulation in place to:
  - Help reduce the use of coal and petroleum coke in Ontario
  - Promote reduction of greenhouse gases (GHGs)
  - Regulate the use of Alternative Low Carbon Fuels
- The regulation defines the framework and controls for facilities that want to use the Alternative Low Carbon Fuels in terms of types and quantity of materials that can be used



**Enclosed ALCF Storage Container**

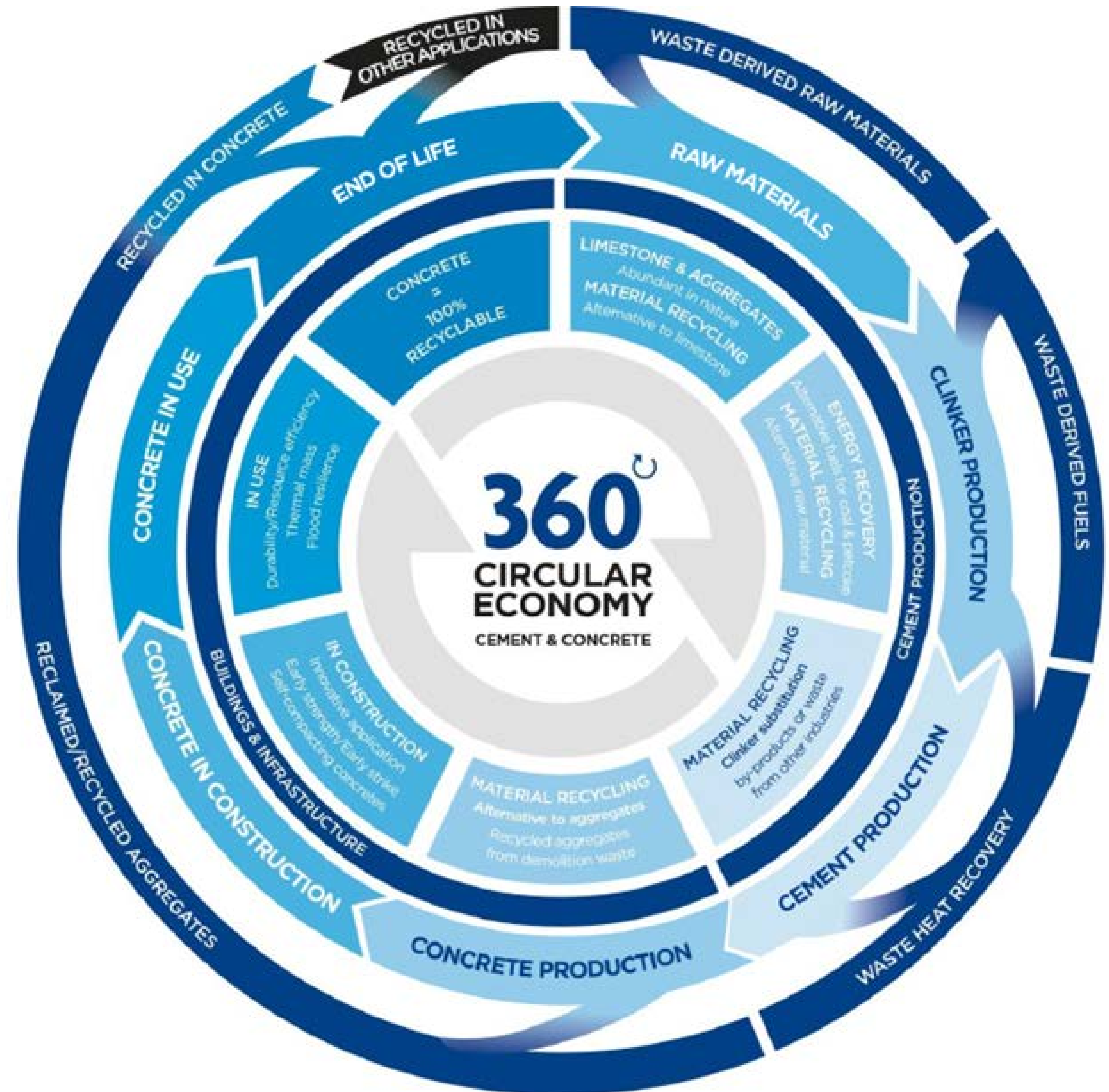
*“There is no ‘singular’ solution to reducing the impact of society on the environment.”*

Source: Concrete Council of Canada. Rediscover Concrete, Reducing our Footprint,.

## How is SMC considering the Environment?

The strategy of the cement industry to use ALCFs (e.g. non-recyclable materials) in their cement production process supports the Circular Economy model

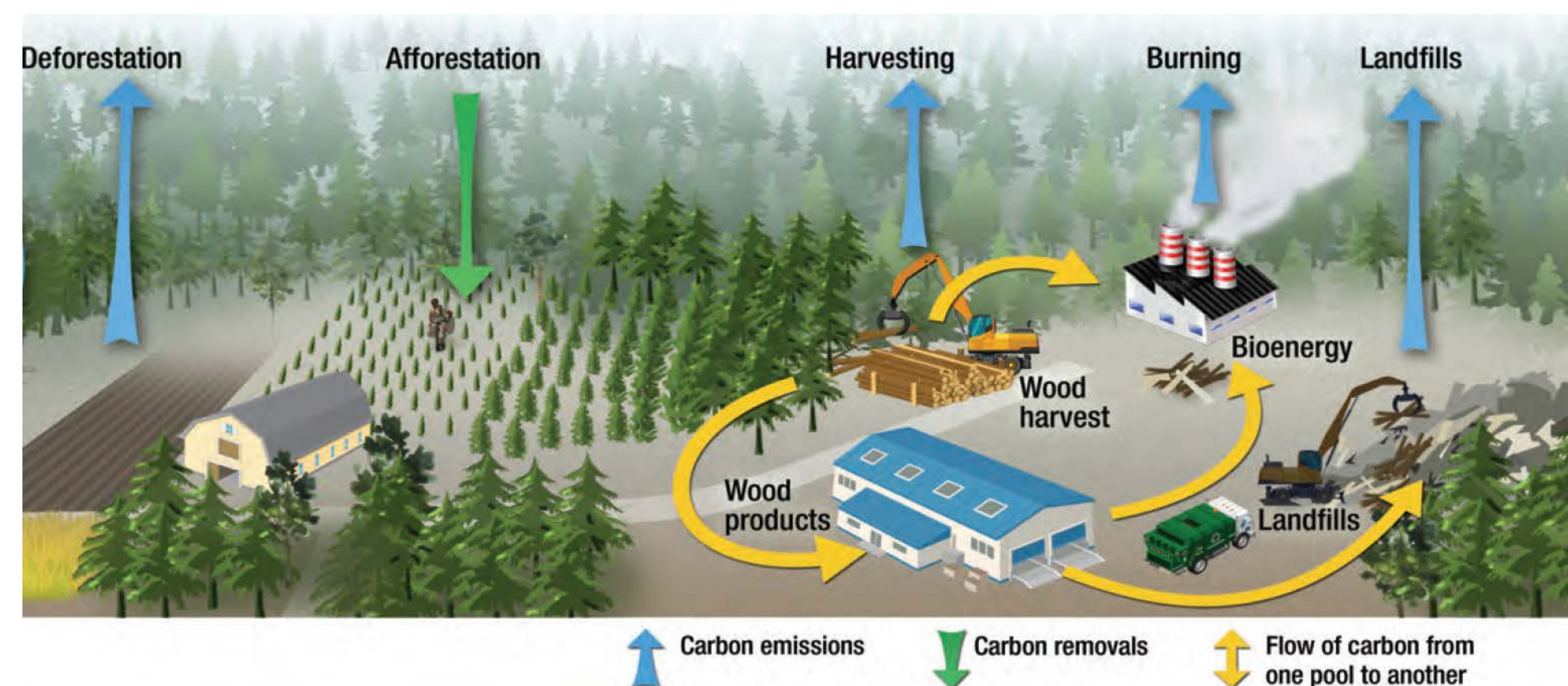
- Design to avoid resource use
- Design for longevity
- Design for reuse
- Design for material / energy recovery



## How is SMC considering the Environment?

### The use of ALCFs in cement production helps reduce Greenhouse Gas Emissions in Ontario

- Long-cycle greenhouse gases, such as carbon dioxide from fossil fuels, are one of the greatest contributors to air pollution and the changing climate
- Using ALCFs in the cement production process replaces the amount of long-cycle carbon used with short-cycle carbon from plants
- Diverting organic materials from landfills also avoids the decomposition of organic material which results in methane release to the natural environment
  - Methane is an approximately 25% more powerful greenhouse gas than carbon dioxide



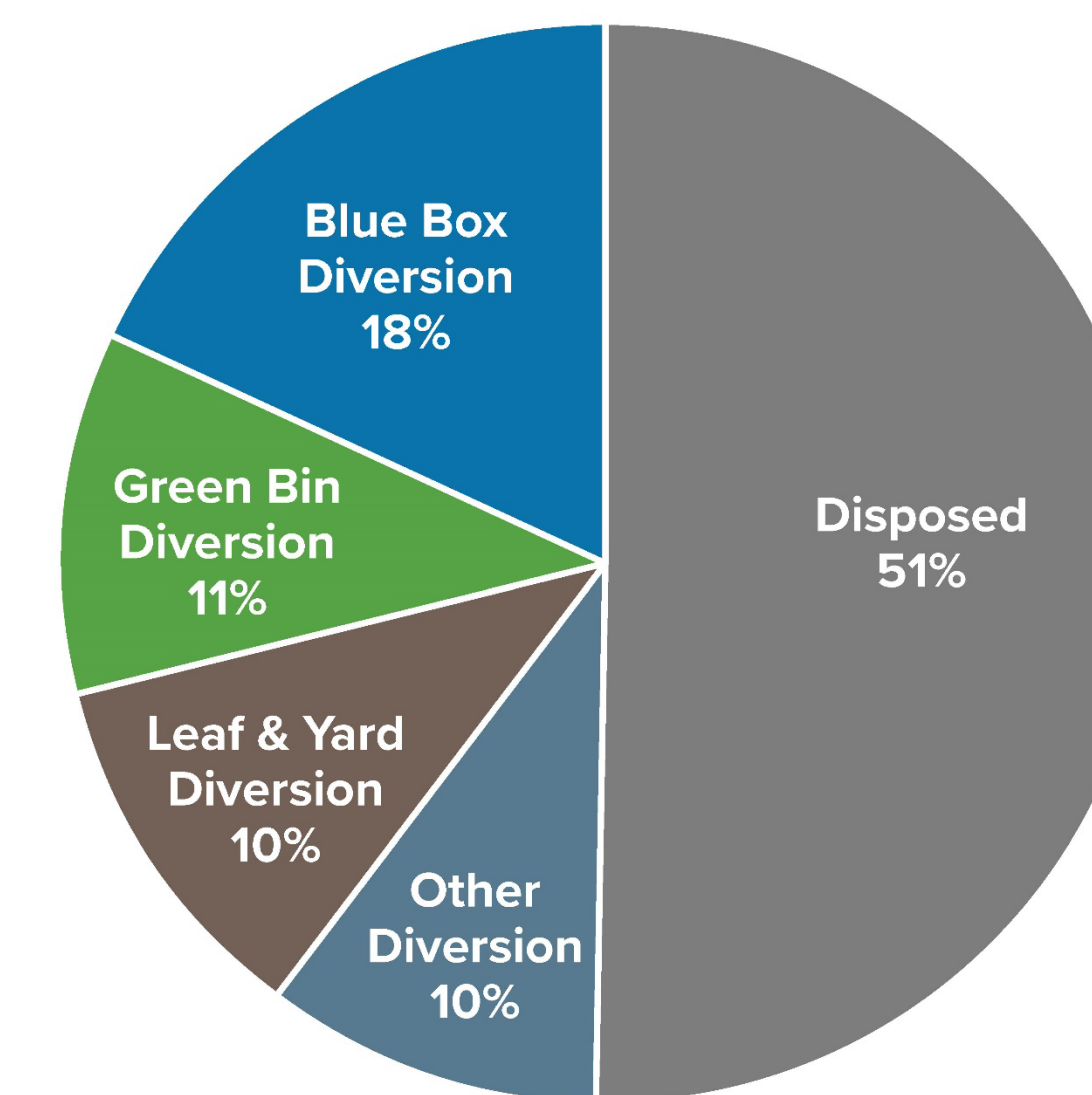
Source: National Resources Canada, 2016

## How is SMC considering the Environment?

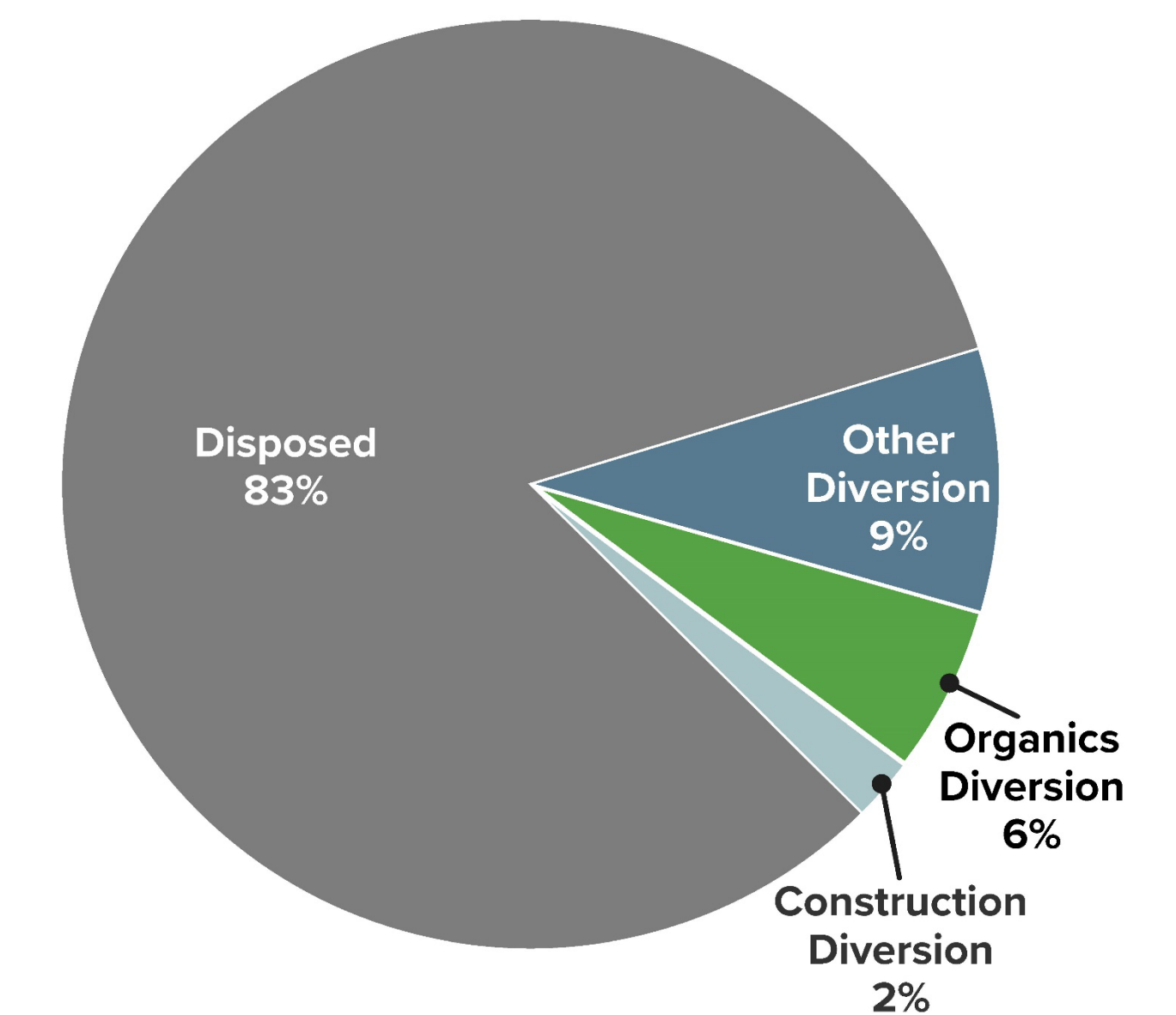
**The use of ALCFs in cement production helps divert non-recyclable materials with significant heat value from ending up in landfills**

- Ontario's Made in Ontario Environment Plan (November 2018):
  - Over 70% of our waste materials continue to end up in landfills
    - Such heavy reliance on landfills will require the province to either focus on determining new sites for landfills or look for new ways to reduce what we send to them
  - The Ontario government proposes the following actions which the introduction of ALCFs will help address
    - Reduce the amount of waste going to landfills or becoming litter
    - Increase opportunities to use technologies, such as thermal treatment, to recover valuable resources in waste

Ontario's Residential and Industrial, Commercial and Institutional Waste Management



**Residential Waste:** Managed by municipalities. Includes waste generated by residents in single-family homes, some apartments and some small businesses. Mix of mandatory and voluntary diversion programs.



**Business Waste:** Managed by the private sector. Includes food processing sites, manufacturing facilities, schools, hospitals, offices, restaurants, retail sites and some apartments. Largely voluntary diversion programs.

**Source:** Ministry of the Environment, Conservation and Parks, Ontario's Environment Plan (2018)

*Waste stops being waste when we can find a valuable use for it*

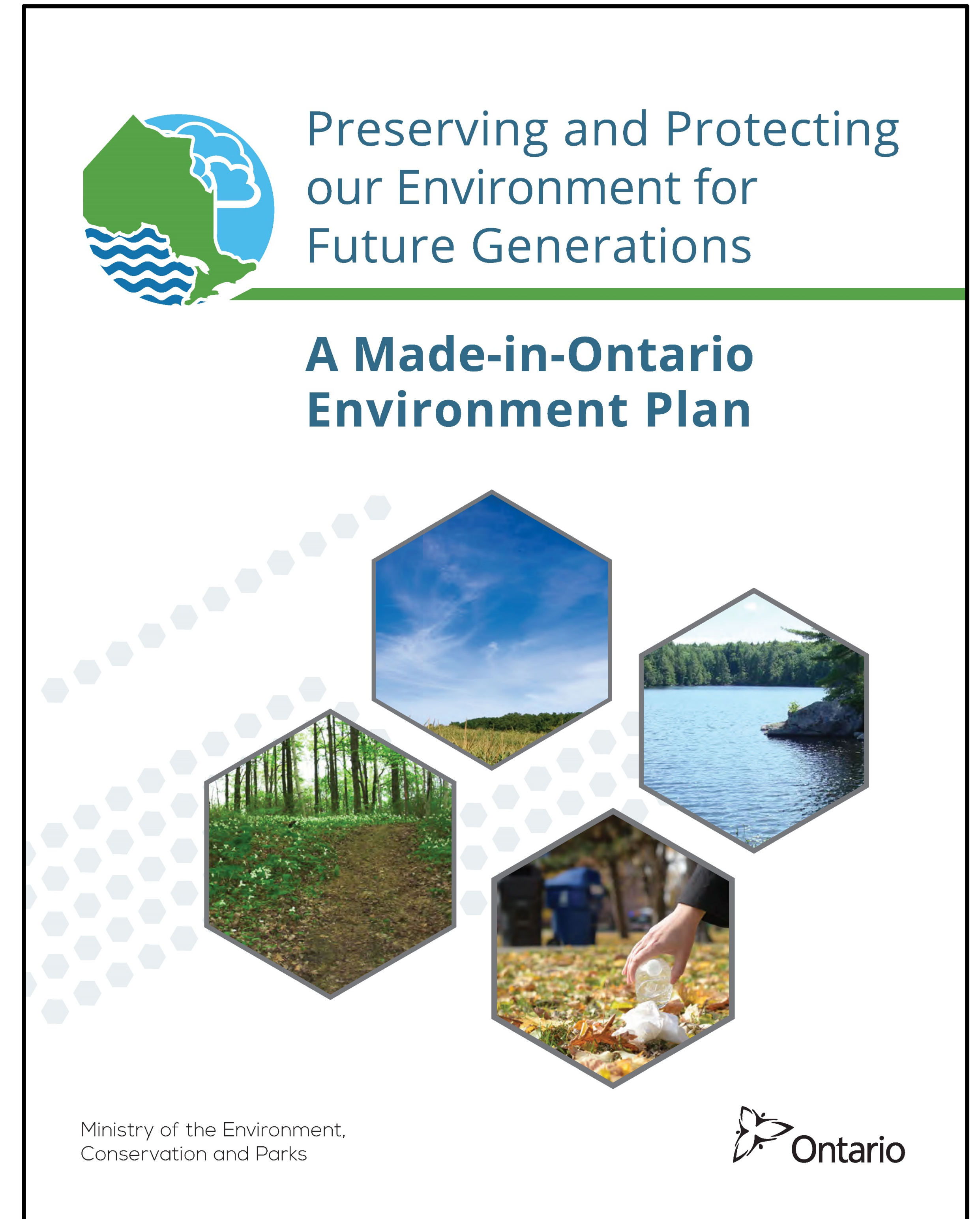
## How is SMC considering the Environment?

### The use of ALCFs in cement production helps reduce the use of non-renewable fossil fuels

- SMC is targeting 30% thermal replacement of conventional fuels reducing the amount of coal and petroleum coke used in the production of cement
- Reducing the use of conventional fuels also reduces the transportation to get those fuels to site.
- Where possible, SMC will focus on using locally sourced ALCFs

*Substituting traditional fossil fuels, including coal, with lower carbon alternatives has the potential to yield significant GHG reductions across Canada. In leading jurisdictions, some cement facilities have achieved carbon intensity reductions of over 50% in the fuels they use.*

Source: Concrete Council of Canada. Rediscover Concrete, Reducing our Footprint.



Preserving and Protecting  
our Environment for  
Future Generations

**A Made-in-Ontario  
Environment Plan**

Ministry of the Environment,  
Conservation and Parks

Ontario

## How is SMC considering the Environment?

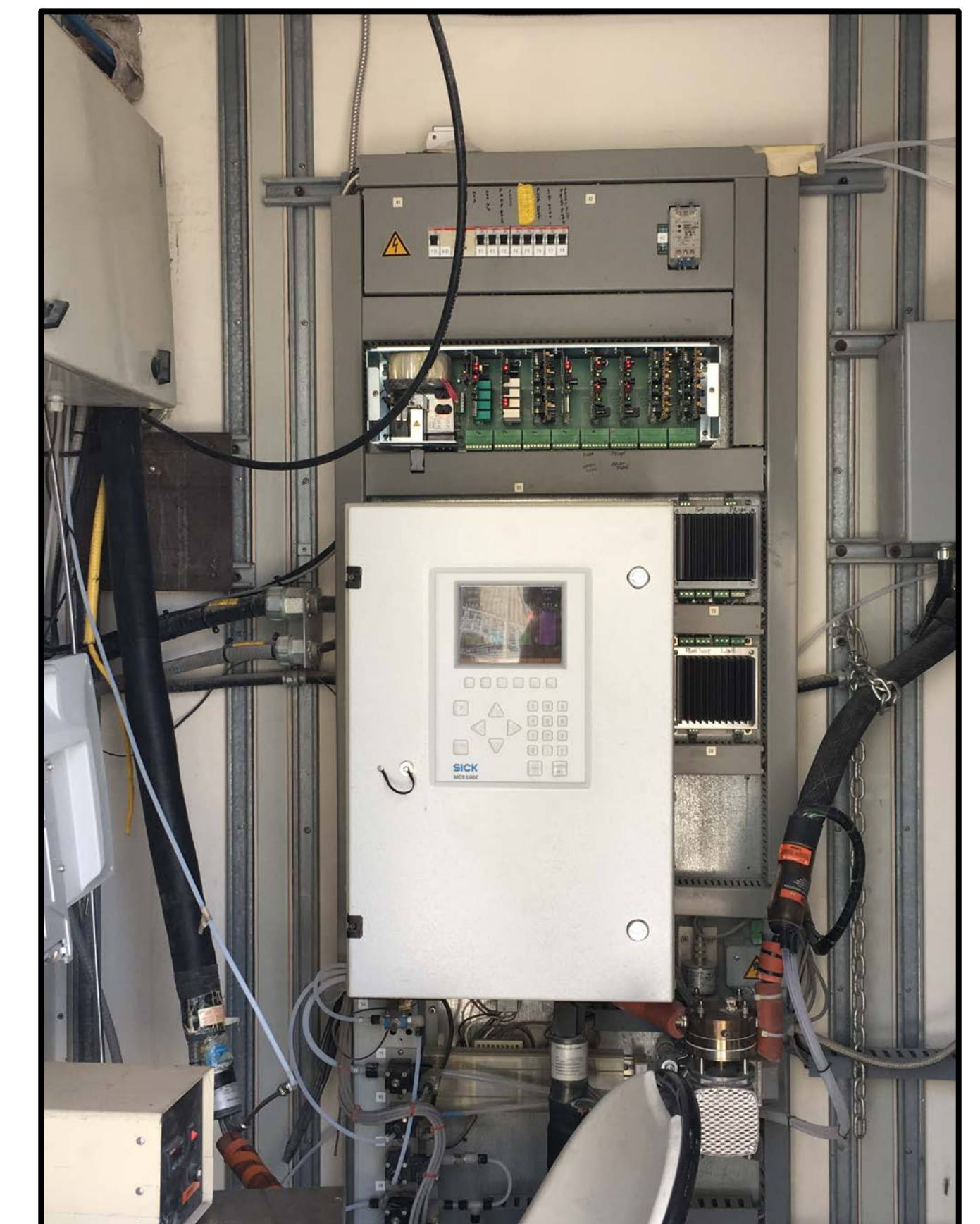
- The potential environmental effects of the use of coal and petroleum coke as fuel sources in the cement industry is closely monitored in Ontario
- The potential environmental effects of using ALCF materials are understood through the results of the demonstration project and the environment effects assessments for other studies that have been conducted
  - Substituting coal and petroleum coke with the proposed ALCFs will help reduce GHG without increasing the impact on the environment from cement production
  - The nature of the cement making process minimizes the potential environmental impacts as extremely high temperatures are necessary to produce the clinker product
- SMC is conducting the following environmental studies to assess the potential environmental effects this increased substitution may have in the vicinity of the Site:
  - Air Quality Study and Cumulative Effects Assessment
  - Acoustic (Noise) Study
  - Traffic Impact Study
- As part of this application, SMC is also preparing a Carbon Dioxide Emission Intensity Report to demonstrate the proposed ALCFs have a lesser / lower carbon dioxide emission intensity than conventional fuels (coal and petroleum coke)

## How is SMC considering the Environment?

As part of this project, SMC will build on their existing monitoring plan to continue to demonstrate the safe use of the ALCF material and on-going compliance with applicable environmental regulations

The Site has various monitoring practices and analytical monitoring instruments already in place. Current monitoring includes but is not limited to:

- Conventional and ALCF feed rates to track coal substitution rates
- Periodic ALCF material testing to control the feed materials
- Temperature profile of the kiln and combustion air oxygen levels to demonstrate complete combustion of the fuels and proper operating conditions to produce the clinker
- Continuous emission monitoring for nitrogen oxides, sulphur dioxides, opacity and total hydrocarbon in the kiln exhaust to demonstrate that the pollution control equipment is operating properly
- Ambient monitoring around the Site perimeter (PM10 monitors)
- Control operation system that automatically monitors air emissions and process parameters
- Interlock system that will shut down the system in the event of any abnormality or exceedance
- Alarm system is in place that emails alarms to staff when set parameters are not being met
- Vendor evaluation process for ALCF materials supplier



## Current Monitoring

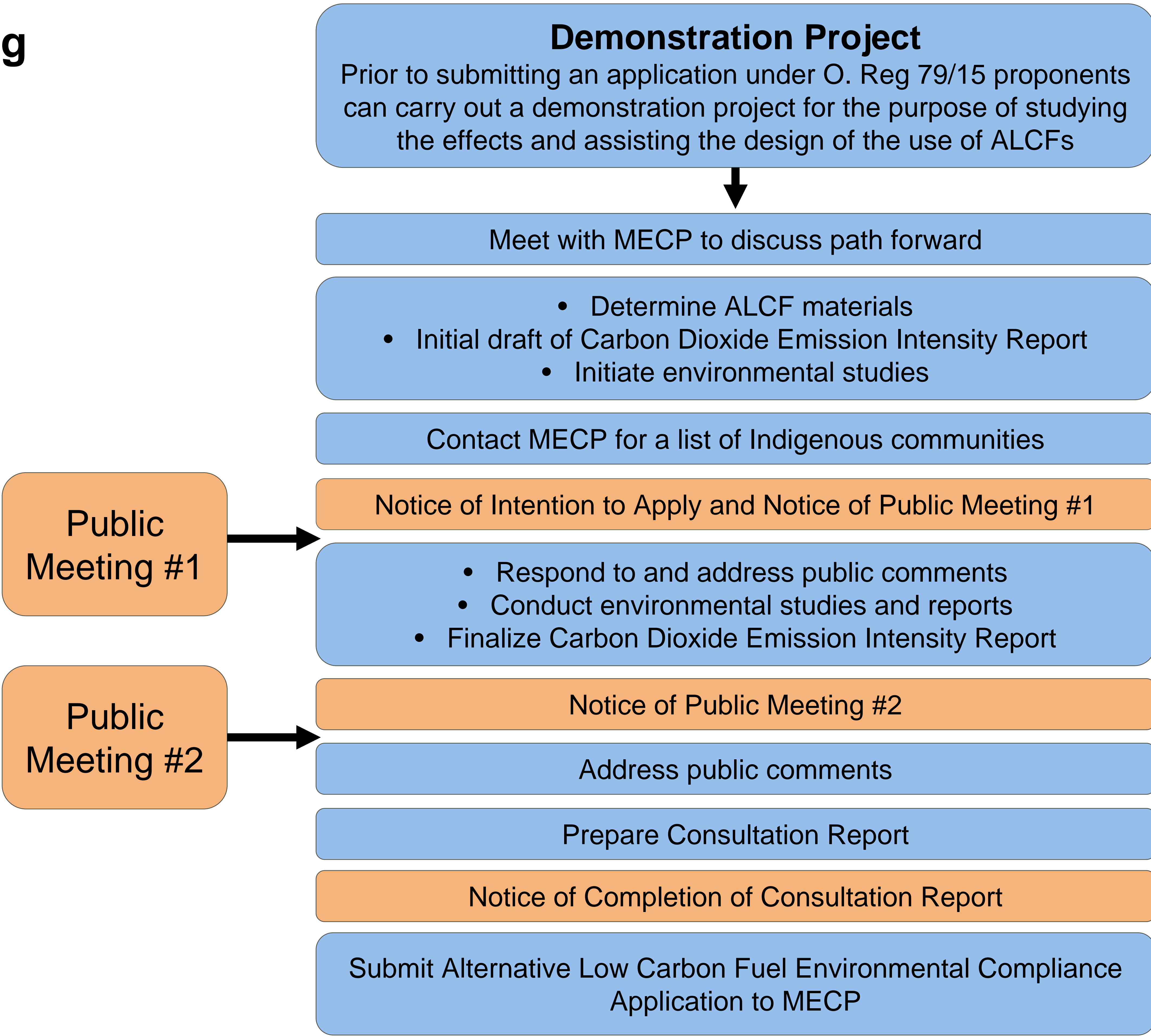


There are stations located around SMCB that monitor dust and vibration that including the following metrics:

- PM 10 BAM (Beta Attenuation Monitor) – used to measure particulate matter 10 micrometres or less in diameter
- Dust Fall Jar – used to collect large air particles for measurement
- PM 10 Hi Vol (High Volume) – used to measure ambient air
- Seismograph – used to measure ground motion or vibrations

In addition to the ambient air quality monitors around the site, the site also has a Continuous Emissions Monitoring System that monitors the main stack to provide information about air emissions.

How is this project being conducted?



What is the timeline for this project?

Next Steps	Anticipated Schedule
Respond to public comments and address public concerns	September to October 2019
Conduct environmental studies and reports	September to October 2019
Finalize Carbon Dioxide Emission Intensity Report	September to October 2019
Public Meeting / Open House #2	November 2019
Respond to public comments	November 2019
Finalize environmental reports	November 2019
Prepare Consultation Report and post it for public viewing on the project website	December 2019
Submit ALCF O. Reg 79/15 Application to MECP	December 2019 / January 2020
MECP to review Application	Spring/Summer 2020

# We want to hear from you!



## How can you participate in this project?

- Talk to our team members today or fill out a comment form and we will respond
  - We would appreciate if you send your comment forms to us by **Friday October 4, 2019**
- Visit our website: [StMarysCement.com/BowmanvilleALCF](http://StMarysCement.com/BowmanvilleALCF)
  - All notices and presentation materials will be posted on the project website
- Contact us by Phone or Email:

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