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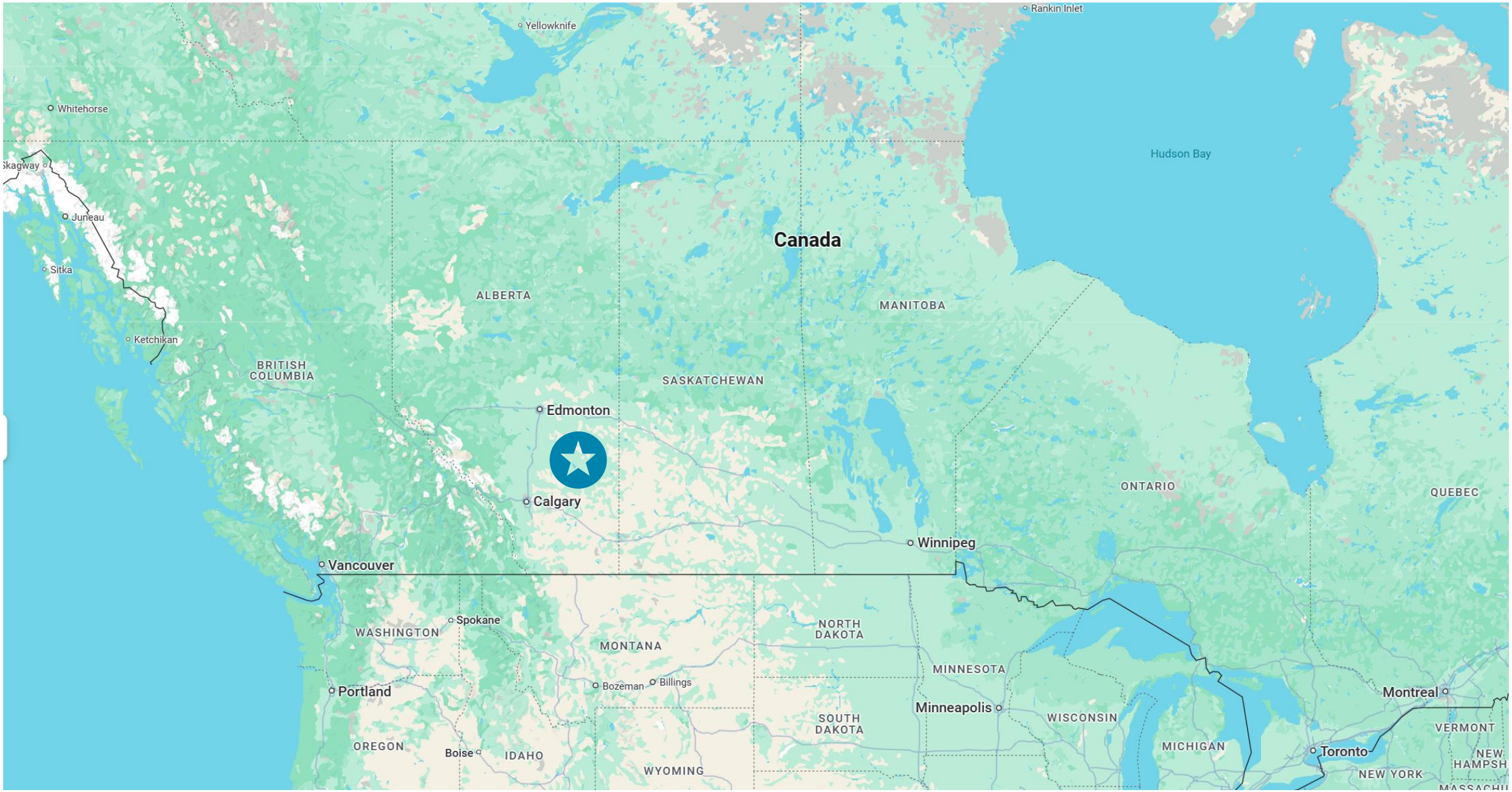
Advancing the Utilization of Harvested Coal Ash as a Supplementary Cementitious Material in Canada

Kelly Babichuk
Vice President & GM

March 31, 2025


Yellowknife
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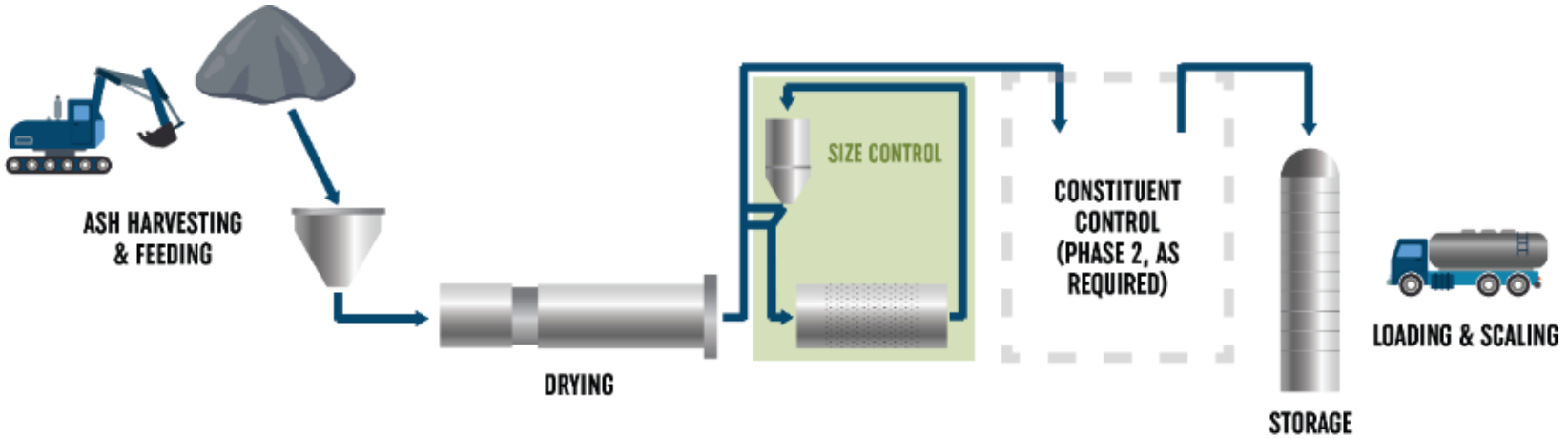
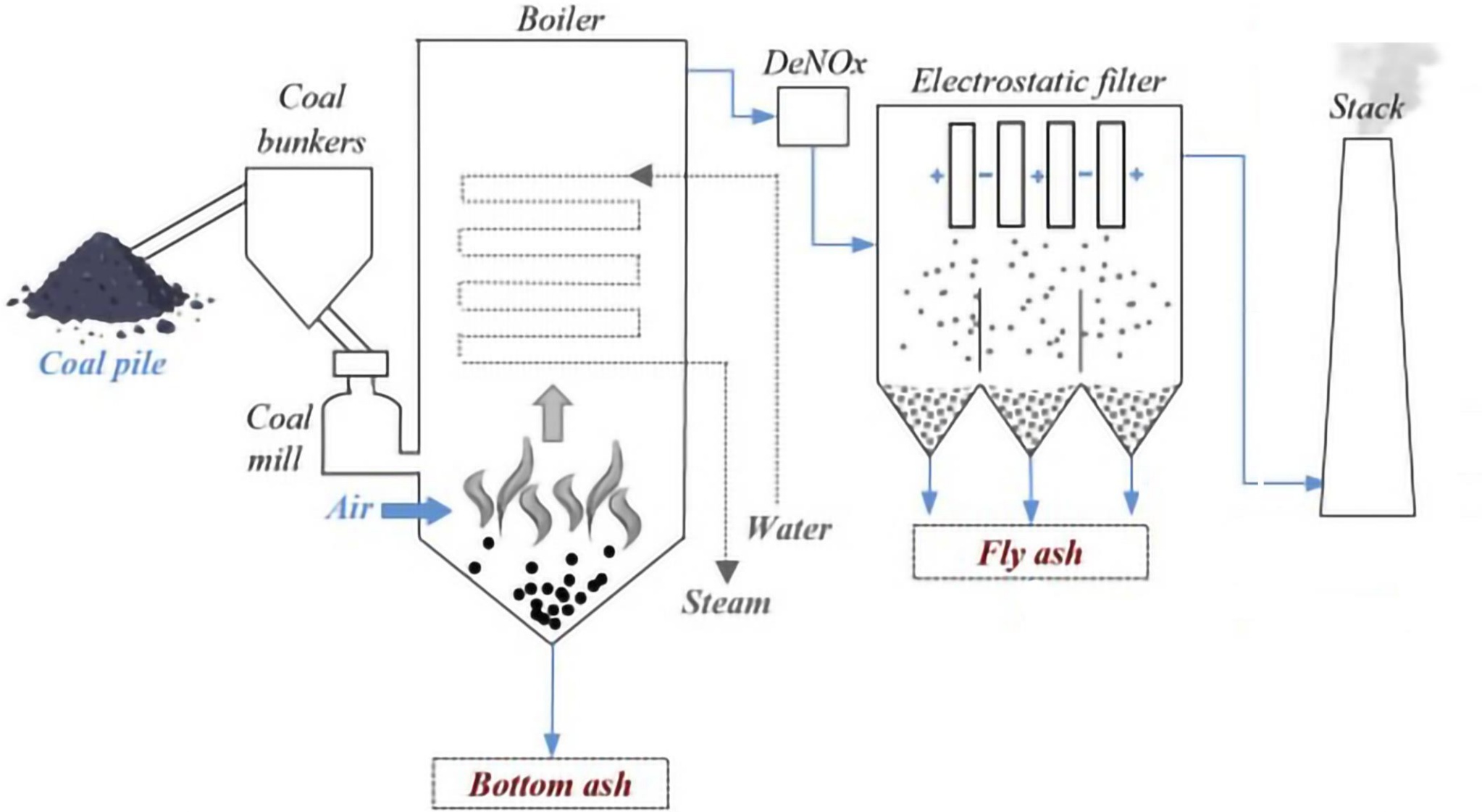
RAM™

Reclaimed Ash Management



- Simultaneous processing both fly and bottom ash
- Zero waste
- Low capital to capacity cost
- Substantial CO_2 reduction in concrete

PATENTED


Boiler
DeNOx
Electrostatic filter
Stack
Coal bunkers
Coal pile
Coal mill
Air
Water
Steam
Fly ash
Bottom ash

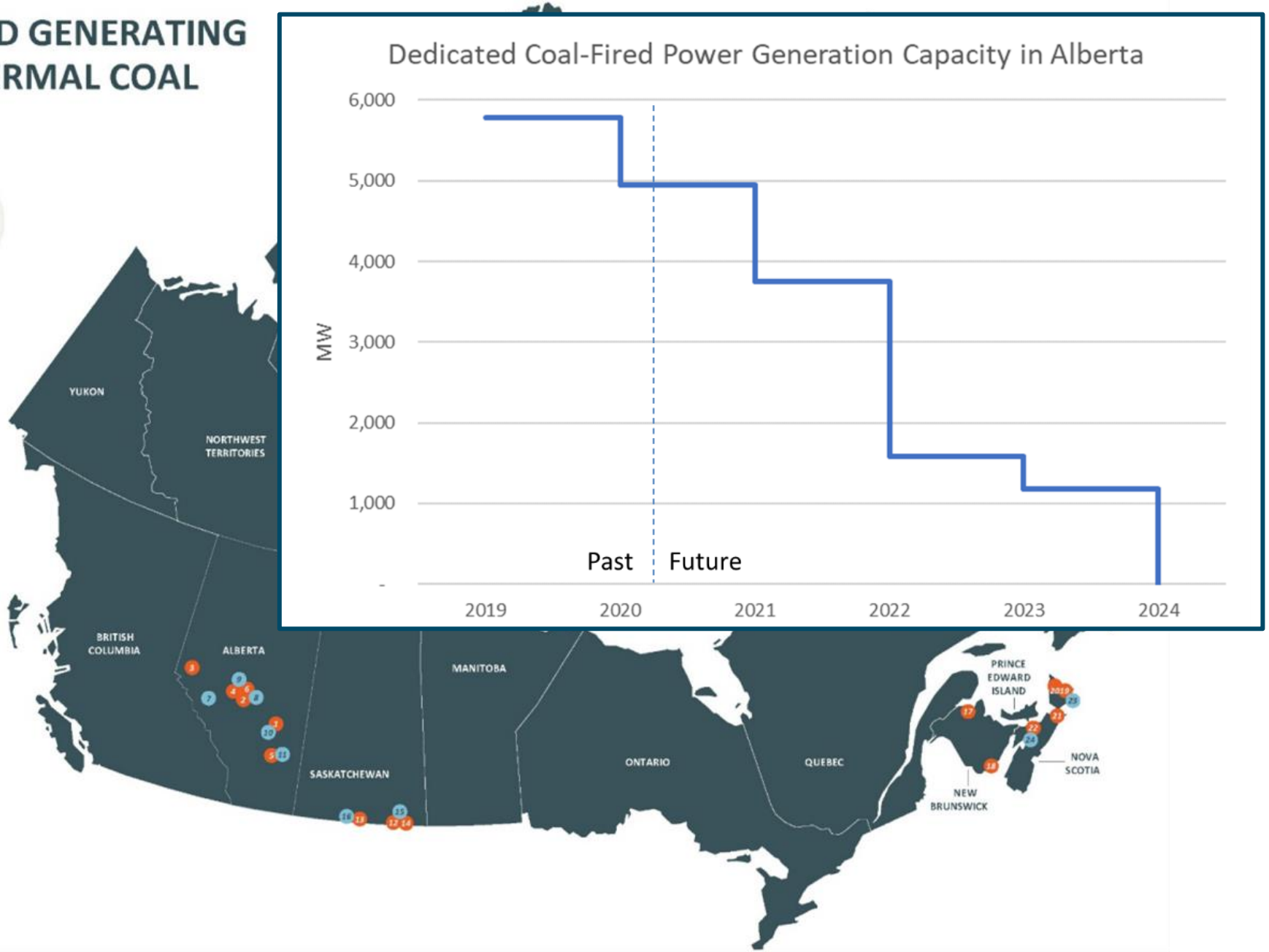
MAP OF COAL-FIRED GENERATING STATIONS AND THERMAL COAL MINES IN CANADA

Alberta

- 1 Battle River Generating Station
- 2 Genesee Generating Station
- 3 H.R. Milner Generating Station
- 4 Keephills Generating Station
- 5 Sheerness Generating Station
- 6 Sundance Generating Station
- 7 Coal Valley Mine
- 8 Genesee Mine
- 9 Highvale Mine
- 10 Paintearth Mine
- 11 Sheerness Mine

Saskatchewan

- 12 Boundary Dam Power Station
- 13 Poplar River Power Station
- 14 Shand Power Station
- 15 Estevan Mine
- 16 Poplar River Mine



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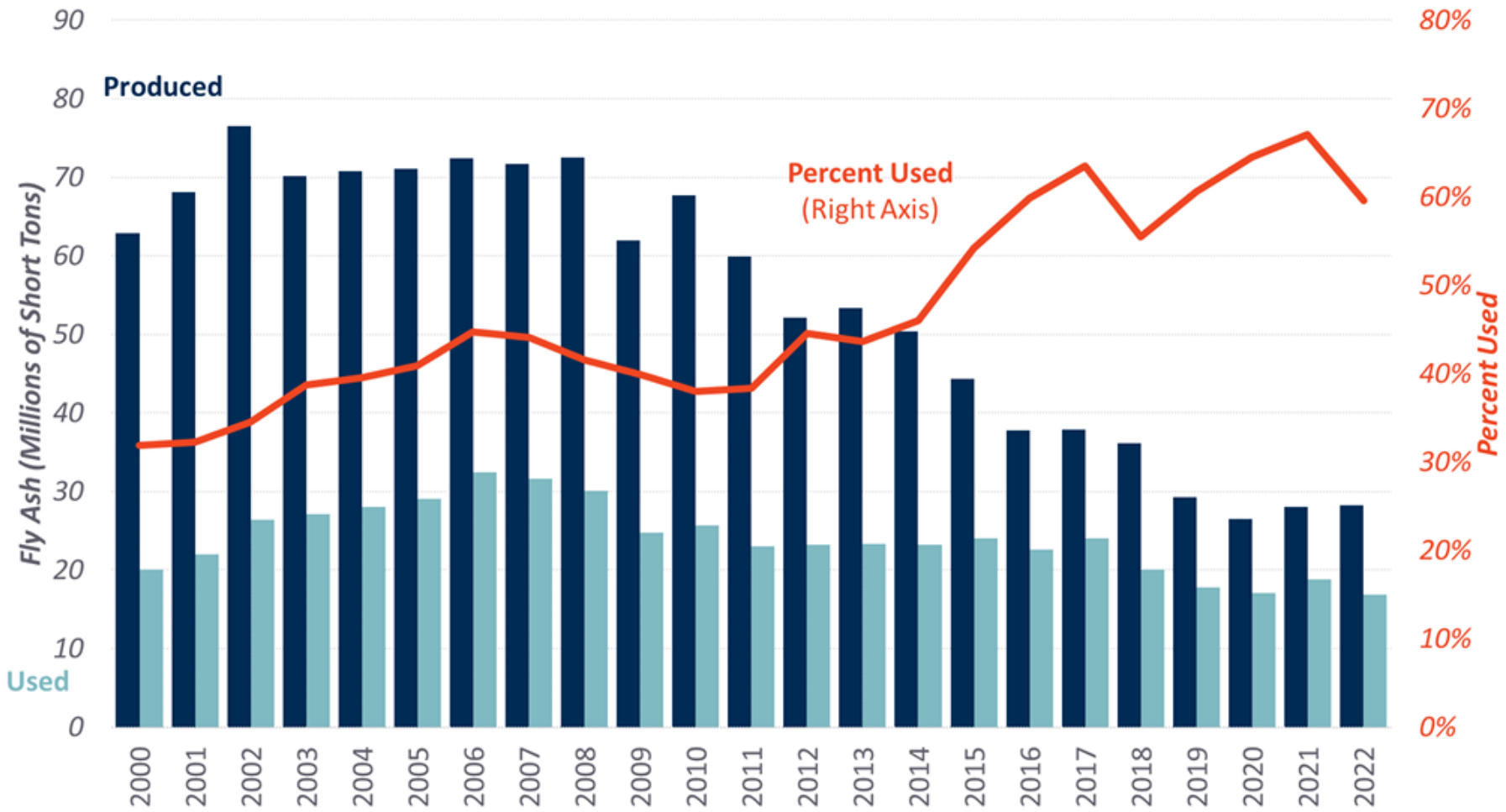
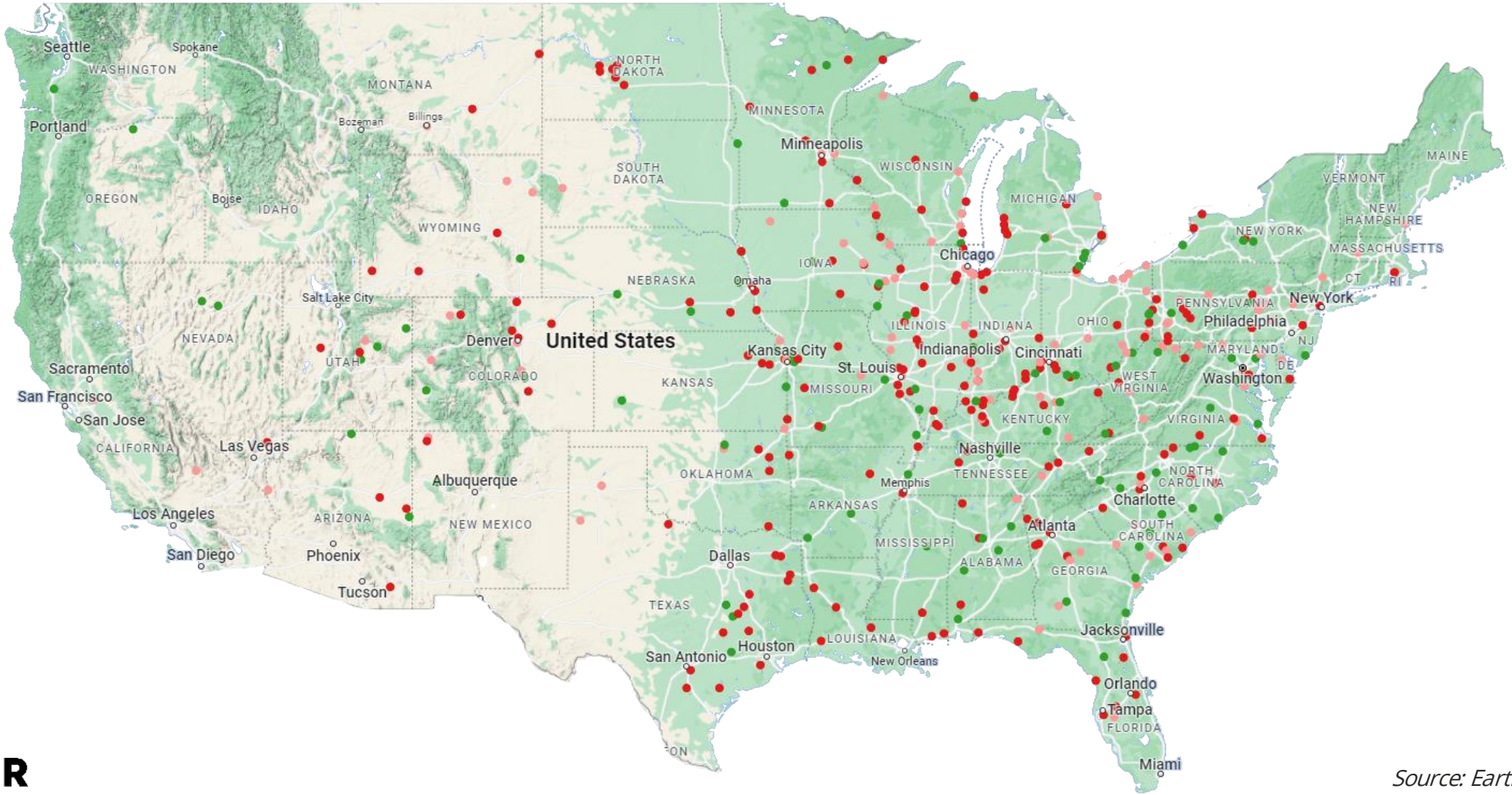
Source: Government of Canada: Final Report by the Task Force on Just Transition for Canadian Coal Power Workers and Communities

Fly Ash Production & Use (U.S.)



Source: ACAA

Coal Ash in the USA



Source: Earthjustice

Why Coal Ash Harvesting?

A reliable and economic solution to the SCM supply challenge

- Abundant
- Technically, well-understood and accepted
- Domestic!

Easy way to lower the clinker content in concrete (GHG reduction)

Eliminate environmental impacts associated with ponds or landfills

- Put that ash where it belongs…fully encapsulated in concrete!

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Fly ash — the finely divided residue that results from the combustion of pulverized coal or a combination of pulverized coal blended with up to 30% by mass of petroleum coke and is carried from the combustion chamber of a furnace by exhaust gases.

Notes:

(1) *Fly ash is classified as Type F, CI, or CH by its calcium oxide (CaO) content, as specified in Table 7.*

(2) *The co-combustion of coal and petroleum coke can change the relationship between loss-on-ignition and air-entraining admixture requirements.*

5.1 Types

The naming practice for supplementary cementitious materials and blended supplementary cementitious materials shall be as follows:

Type	Name
N	Natural pozzolans
F	Fly ash with low calcium oxide (CaO) content
CI	Fly ash with intermediate calcium oxide content
CH	Fly ash with high calcium oxide content
SF	Silica fume with high silicon dioxide (SiO_2) content
SFI	Silica with intermediate SiO_2 content
S	Ground granulated blast-furnace slag
BMb	Blended supplementary cementitious materials (see Clause 5.2)
G_H	Ground glass with high alkali content
G_L	Ground glass with low alkali content

Note: *For materials other than those listed above that fall outside the scope of this Standard (e.g., quenched ground bottom ash, manufactured and other metallurgical slags, and silica fume with less than 75% SiO_2), see CSA A3004-E1.*

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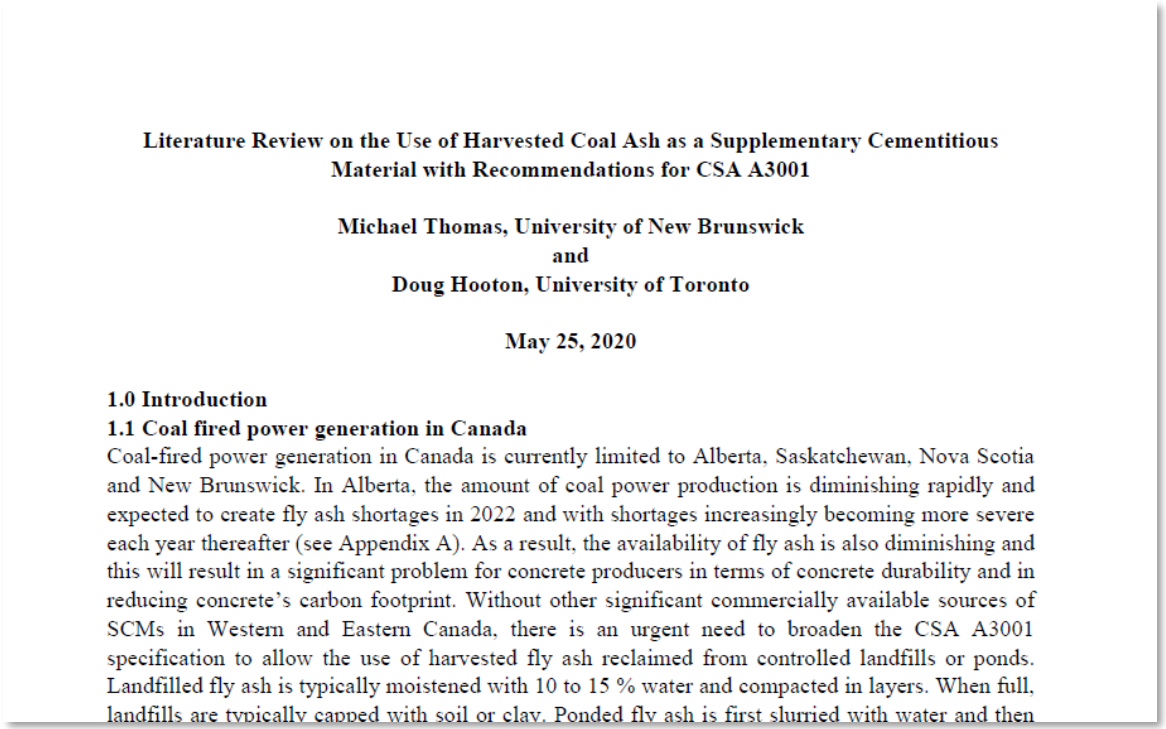
White Paper



Literature Review on the Use of Harvested Coal Ash as a Supplementary Cementitious Material with Recommendations for CSA A3001

Michael Thomas, University of New Brunswick
and
Doug Hooton, University of Toronto

May 25, 2020

1.0 Introduction

1.1 Coal fired power generation in Canada

Coal-fired power generation in Canada is currently limited to Alberta, Saskatchewan, Nova Scotia and New Brunswick. In Alberta, the amount of coal power production is diminishing rapidly and expected to create fly ash shortages in 2022 and with shortages increasingly becoming more severe each year thereafter (see Appendix A). As a result, the availability of fly ash is also diminishing and this will result in a significant problem for concrete producers in terms of concrete durability and in reducing concrete's carbon footprint. Without other significant commercially available sources of SCMs in Western and Eastern Canada, there is an urgent need to broaden the CSA A3001 specification to allow the use of harvested fly ash reclaimed from controlled landfills or ponds. Landfilled fly ash is typically moistened with 10 to 15 % water and compacted in layers. When full, landfills are typically capped with soil or clay. Ponded fly ash is first slurried with water and then

CSA A3000:23

Cementitious materials compendium

*Harvested ash can be considered to fall under the definition of **Fly ash** provided it is tested at the frequency outlined in this Standard and that it conforms to the requirements outlined in this Standard. See the definition for **Harvested ash**.*

Designation: C618 – 23$^{\varepsilon 1}$

Standard Specification for
Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete[1]

3.2.1 *coal ash, n*—fly ash and bottom ash resulting from the process of combustion of ground or powdered coal obtained either from current power plant production or harvested from landfills or impoundments.

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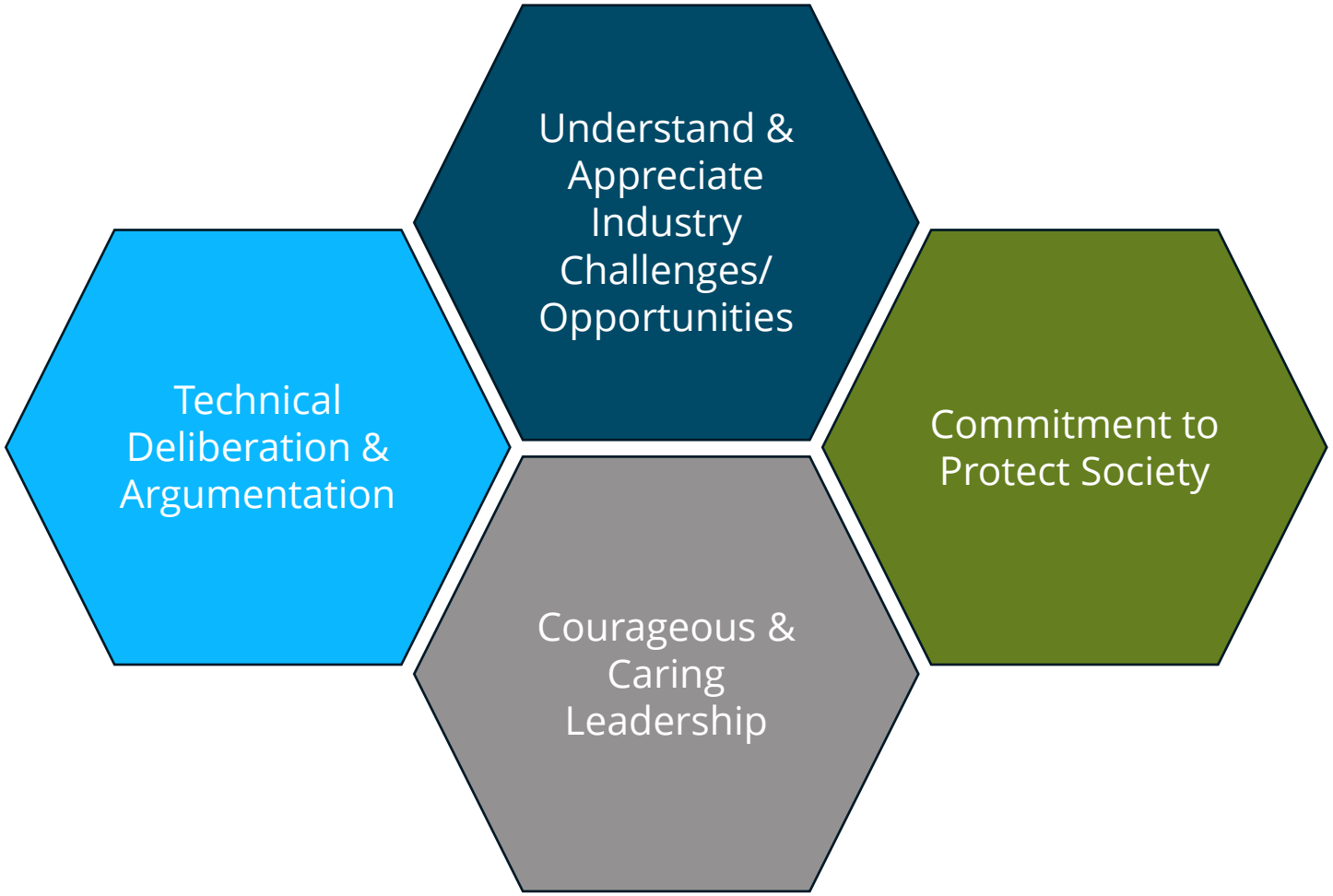
What it Takes



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Thank you

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1015, 909 - 11 Avenue SW
Calgary, AB, T2R 1L7
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