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# Enerkem - Ethanol from Refuse

## Suncor Perspective

# CPTA Education Seminar

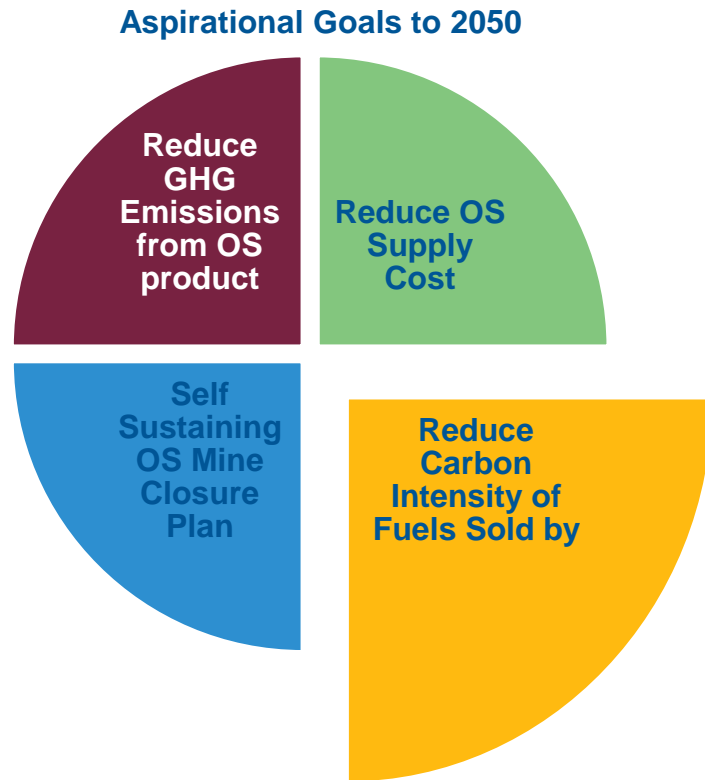
**Presenter:** Bradley Wamboldt, GM – Enterprise Technology, Suncor Energy Inc.

**Date:** March 3, 2020



# Suncor Technology Aspirational Goals

Enterprise Technology's aspiration is to develop technology to provide energy that people need while looking after each other and the earth



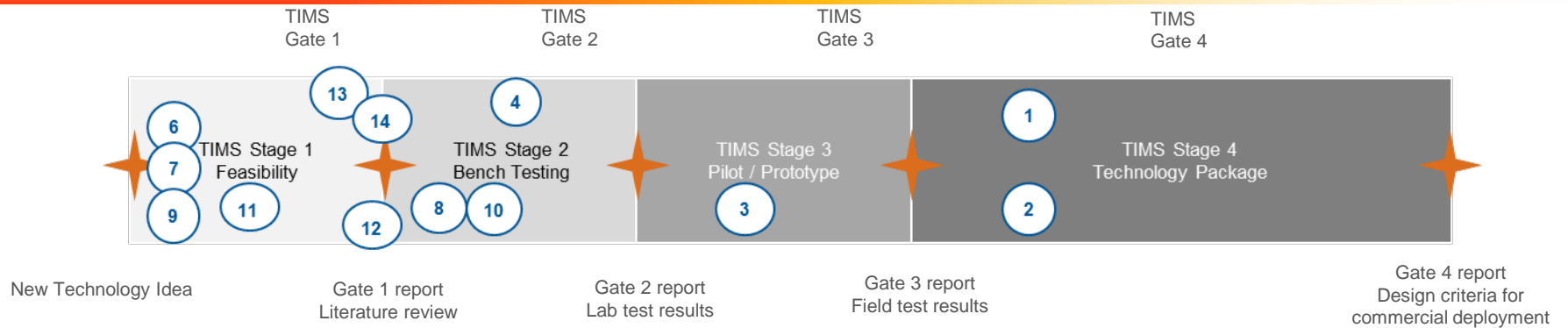
- Enterprise Technology portfolio supports corporate objectives of cost reduction, environmental & safety improvements
  - Opportunities deployed at cost of capital or better
  - Tackle step-change (not incremental) technologies
- Goals aimed at 2050 to support meeting 2030 targets
  - Collaboration can accelerate technology development
- Objectives:
  - Alignment with corporate strategy
  - Allows for measurement of technology portfolio value
  - Provides guidelines for portfolio management

# Economics Driven by Volume

	Carbon Intensity (gCO <sub>2</sub> e/MJ)	Volume (KBPD) Required to achieve	
		10% Carbon Intensity Reduction (CFS Requirement)	25% Carbon Intensity Reduction
Gasoline	90		
1 <sup>st</sup> Generation Renewable Fuels (ie. St. Clair)	40	50*	120
2 <sup>nd</sup> Generation Renewable Fuels	10	35	75
3 <sup>rd</sup> Generation Renewable Fuels	-10	25	40

\* St. Clair plant ~ 13 KBPD

# Renewable Liquid Fuels Technology Pipeline



## List of current and prospective projects:

1. Thermocatalytic Conversion **Enerkem** – Ethanol/methanol

# Low Carbon Intensity Fuel System - Generic



In-Field Residuals



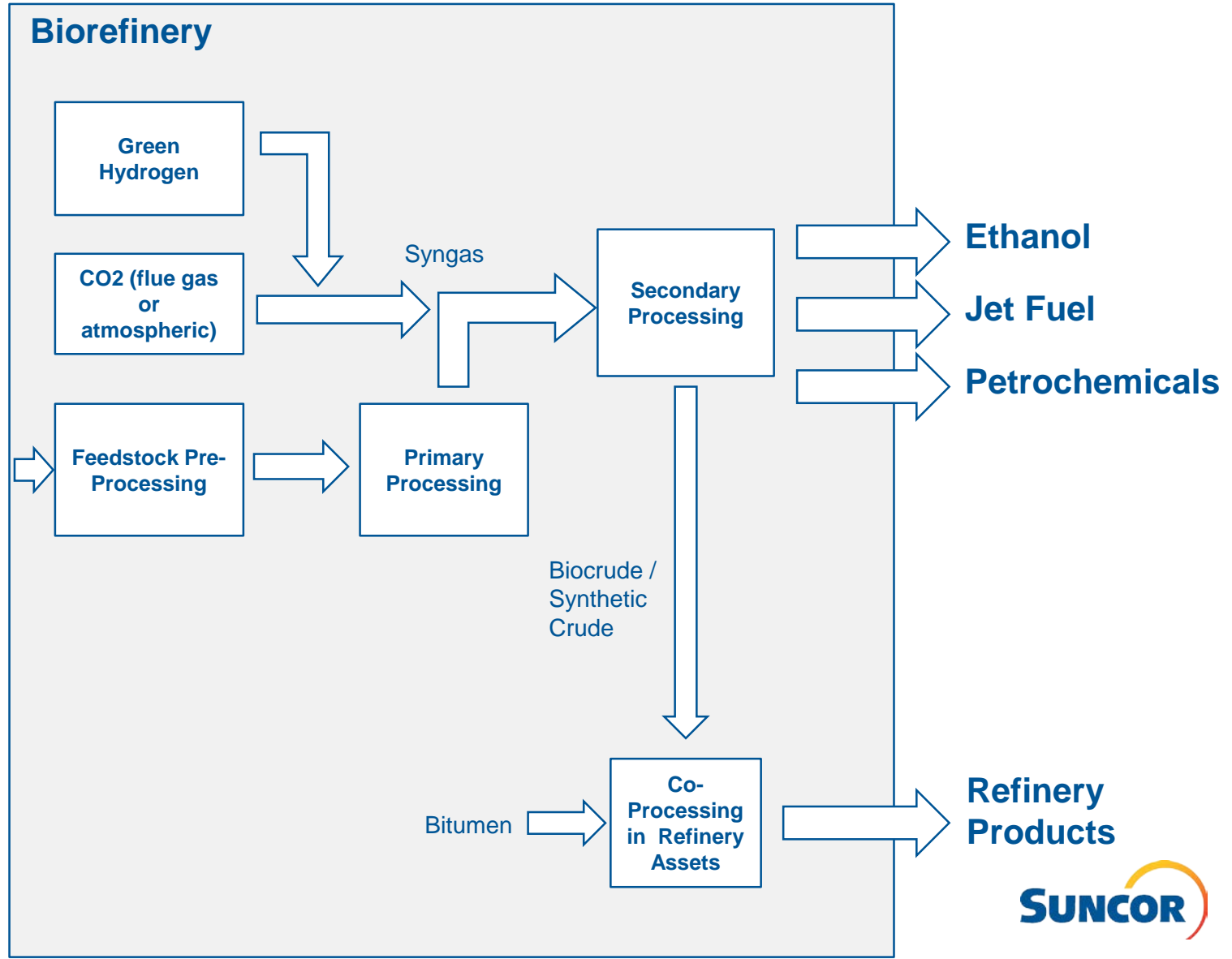
Mill-Residuals



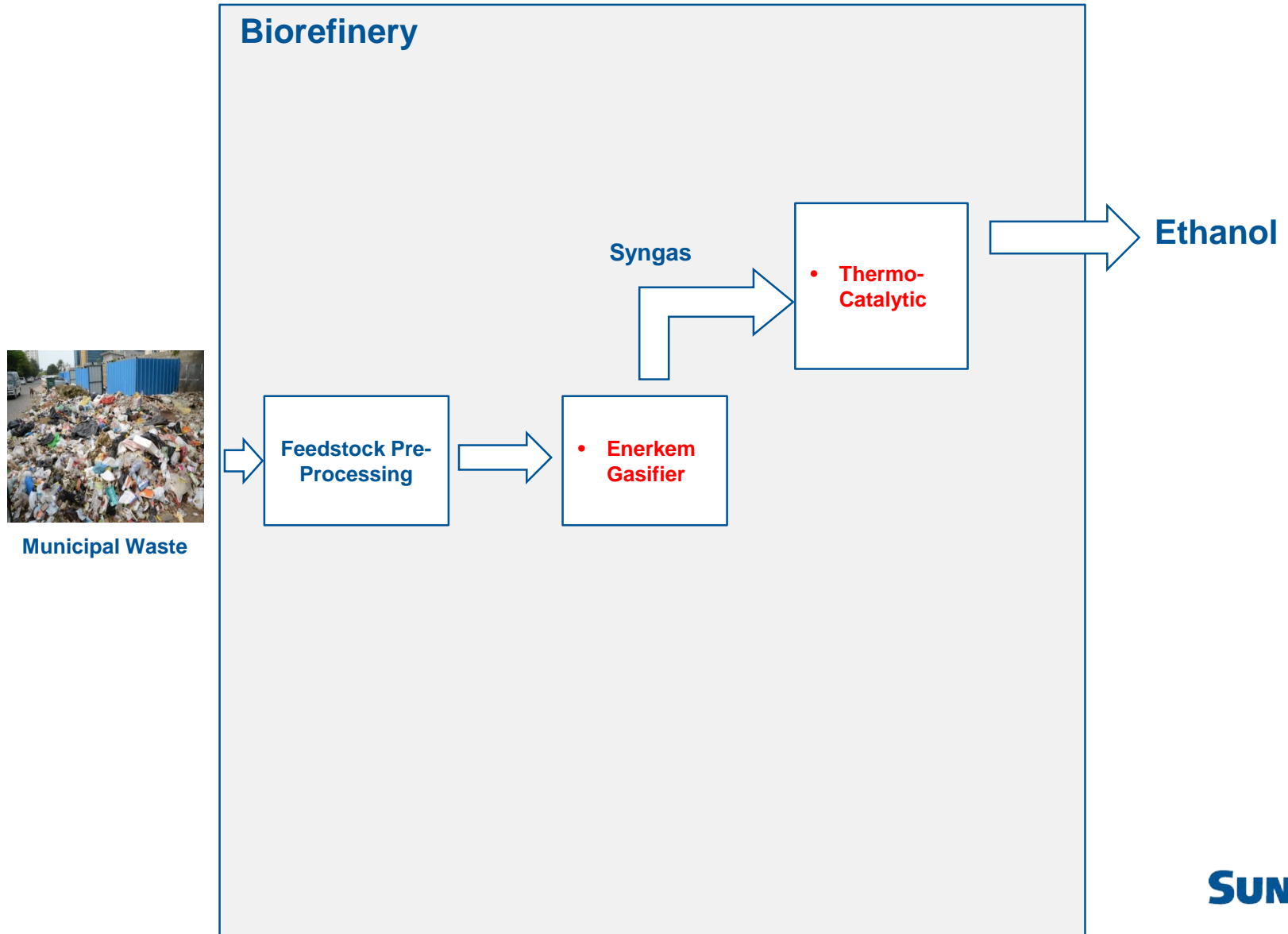
Municipal Waste



Sewage Sludge



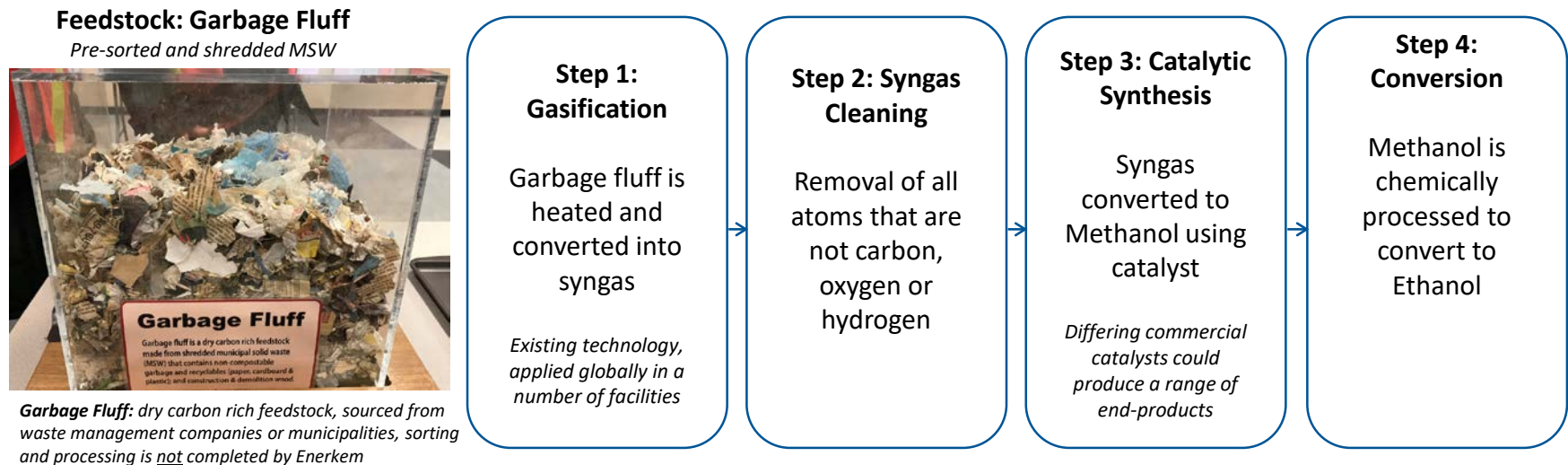
# Low Carbon Intensity Fuel System – Enerkem Pathway



# ENERKEM OVERVIEW

- Enerkem is a Montreal based company that currently converts Municipal Solid Waste (MSW) into biofuels
- Enerkem has recently constructed a plant in Edmonton (planned capacity of 48 ML of Ethanol) and they are currently completing engineering on a Montreal facility (planned capacity of 94 ML of Ethanol)
- Enerkem's ethanol provides materially lower carbon intensity fuel than Suncor's St. Clair ethanol and is currently the lowest CI blending material available globally
- The Enerkem technology converts biomass feedstocks through a gasification process to a syngas which can be used for the production of a variety of fuels and chemicals. Enerkem's research and development team continues to advance their technology to commercially produce new products, ultimately creating an adaptable bio-refinery

## Process overview



Notes:

<sup>1</sup>Enerkem's Edmonton Ethanol -20 to -55CI; St Clair Ethanol +40CI; Petroleum gasoline benchmark at +90CI

# ENERKEM – EDMONTON FACILITY





# THE CITY OF EDMONTON'S INTEGRATED WASTE MANAGEMENT CENTRE

2

3

1

4

- 1 Integrated Processing & Transfer Facility
- 2 Recycling center
- 3 Composting center
- 4 Enerkem biorefinery

20% Recycled  
40% Composted  
30% Biofuels  
10% Landfill

90%  
WASTE DIVERSION

Edmonton

ALBERTA  
INNOVATES

SUNCOR

# What is Suncor's Role

- Patient Strategic Investor (invested in the company)
  - Value is in deployment, not the investor return
  - Influence the development of the technology toward specific deployment opportunities
- Operational and Value Chain Know-How (providing people to the operation)
  - Bring the Operational Discipline required to run large industrial facilities
- Deploy New Technology at Scale (customer)
  - Integrate into our existing value chain
  - Robust financial position to support capital projects
  - Distribution system to bring product to market

# Questions

