



Powering Journeys
Energizing Communities

Low-Carbon Fuels - Regulation, Uses and Production

Rob Pinchuk – Director, Business Planning and Strategy

PARKLAND - WHO ARE WE



Move/Store
Terminals



Sell
Gas Stations and Cardlocks



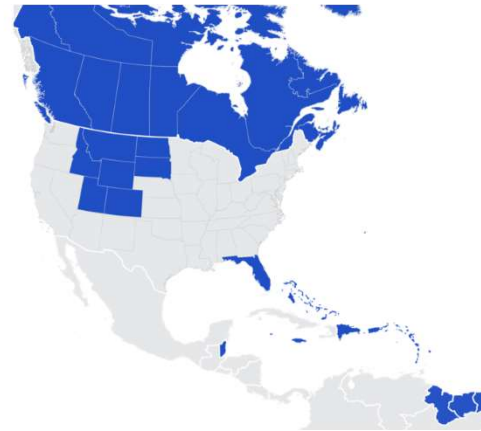
Make/Buy
Refinery

Operating in

Canada

United States

24 Caribbean Countries





PARKLAND

PARKLAND – FUEL MARKETING AND PRODUCTION



BACKGROUND – BURNABY REFINERY

PARKLAND BURNABY REFINERY OVERVIEW – KEEPING BC RUNNING



55,000 bbl/d
nameplate capacity
(light sweet refinery)



The Refinery employs
over 500 people, and
over 100 Power
Engineers



85% of output stays in
British Columbia



40% of output
stays in the
Lower Mainland



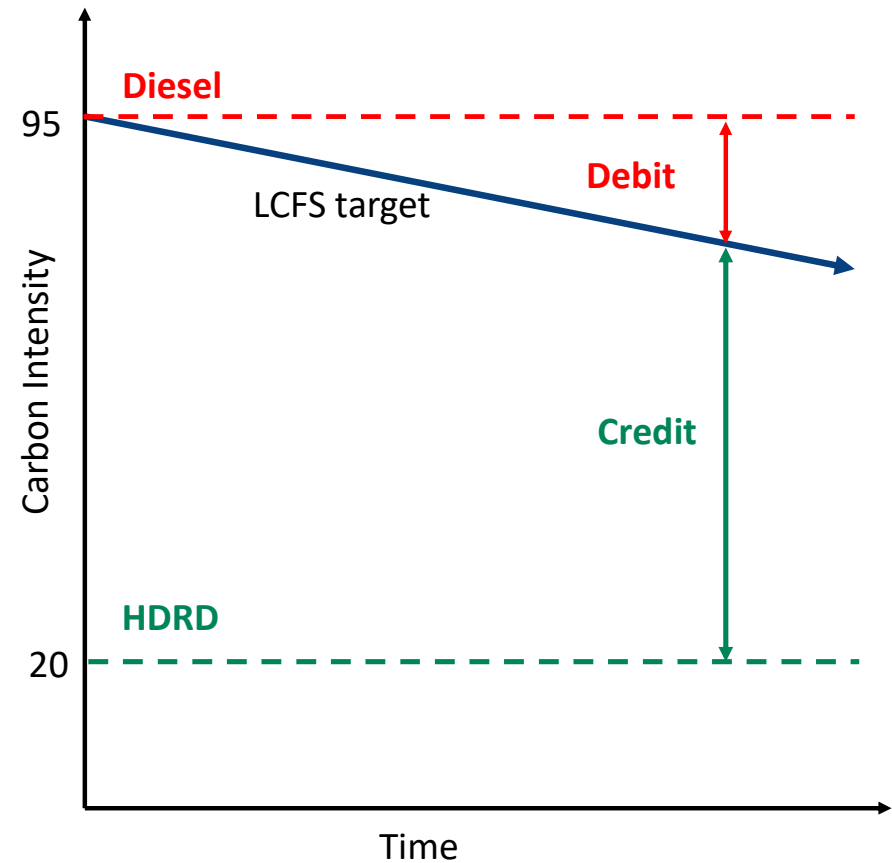
25% of BC's
transportation
fuel



30% of YVR's
jet fuel

Low Carbon Fuel Regulations

- A regulatory approach to reducing the net carbon emissions of fuels
- Mandated reduction in the Carbon Intensity (CI) of fuels
 - CI is gCO₂/MJ-fuel
- Target CI is gradually reduced
- Tends to primarily drive substitution with lower CI alternative biofuels

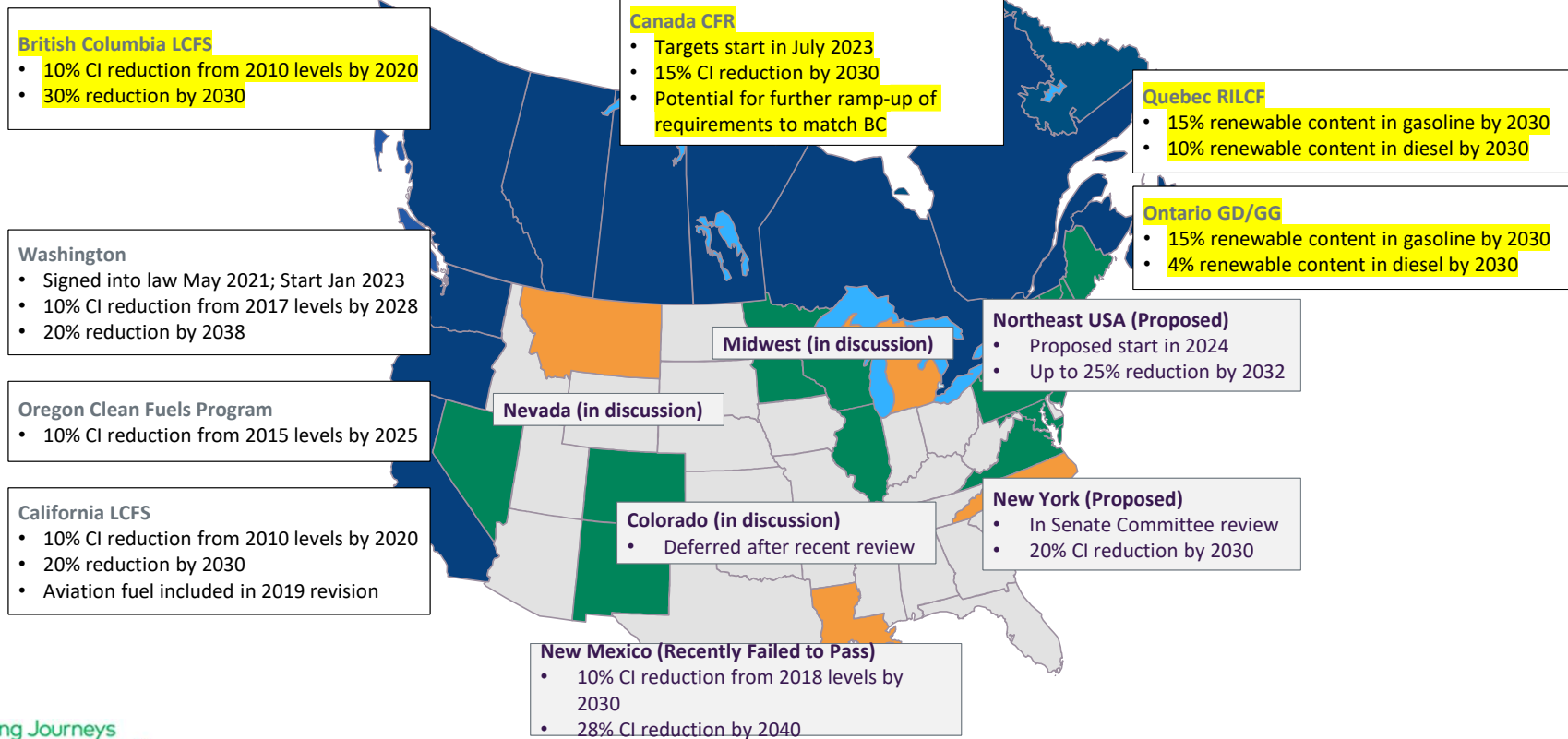


Compliance comes at a cost!

Low carbon polices in NA continue to ramp up

North American Low Carbon Fuel Regulation Summary

● LCFS In Effect ● LCFS Passed ● LCFS Proposed ● GHG Emission Goal



Bio vs Fossil Feed Carbon Cycle

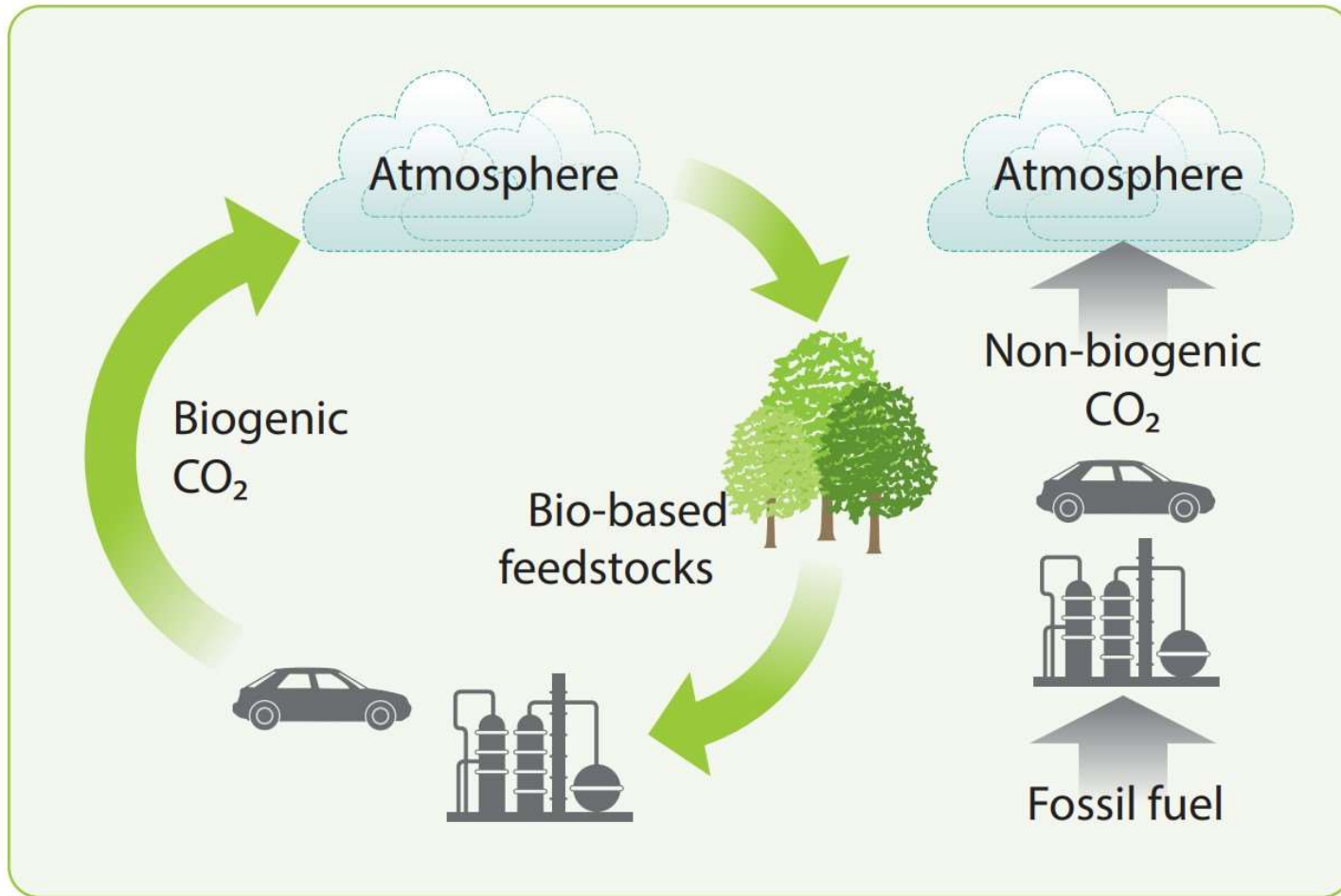


Table ES- 1 CI Parkland Renewable Diesel GHGenius 4.03 Scenario 1

Source	Parkland	
	Alberta Canola Oil	Saskatchewan Canola Oil
Feedstock	g CO ₂ eq/GJ	
Fuel dispensing		
Fuel distribution and storage		
Fuel production		
Feedstock transmission		
Feedstock recovery		
Feedstock upgrading		
Land-use changes, cultivation		
Fertilizer manufacture		
Gas leaks and flares		
CO ₂ , H ₂ S removed from NG		
Emissions displaced		
Total		
Fuel Use		
Grand Total		
CI Grand Total, g CO₂eq/MJ		

Basics

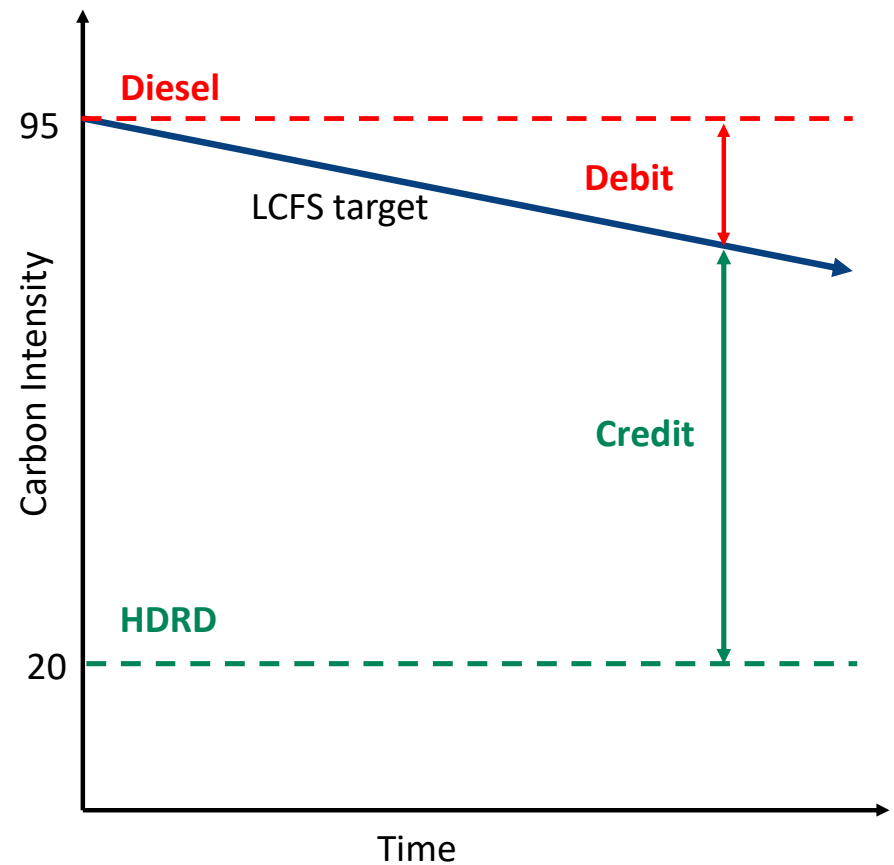
- Set a baseline CI and set a rate of reduction

Things that are common

- Credit market, penalties for non-compliance
- Fuel type indifference or pooling
- Credit banking

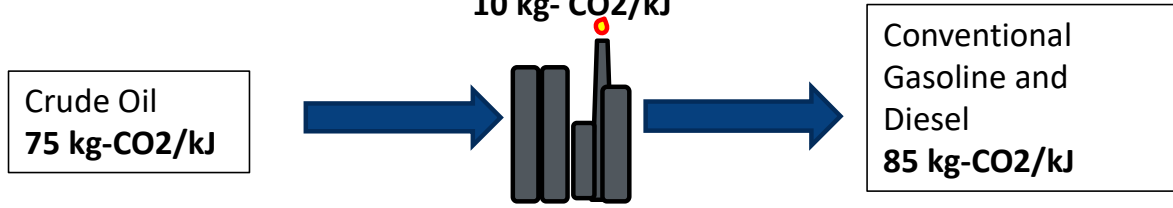
Where things differ

- Inclusion of non-fuel pathways (EV, Carbon Capture, Production Efficiency, RNG)
- Which fuels and Who's obligated



Increasing Efficiency

Direct Facility Emissions in Refining
10 kg- CO₂/kJ



Refining contributes 10% of the Carbon in our Products
Potential to reduce CI by 1% with best efficiency projects

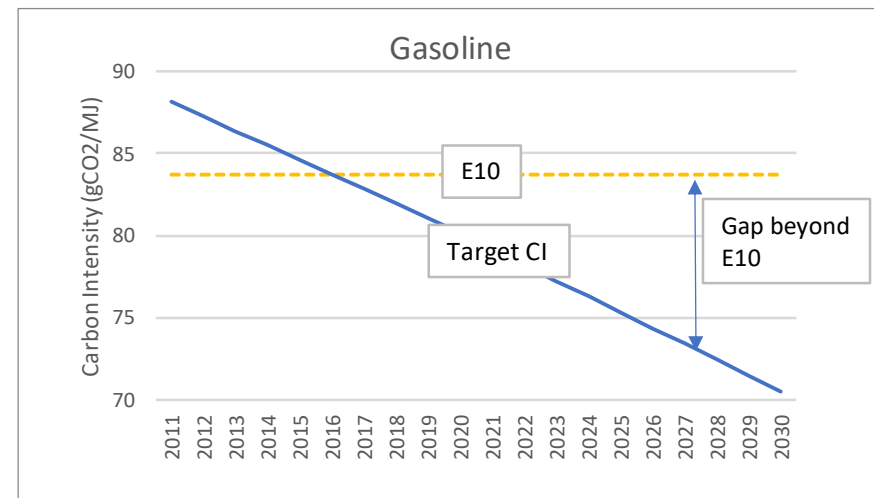
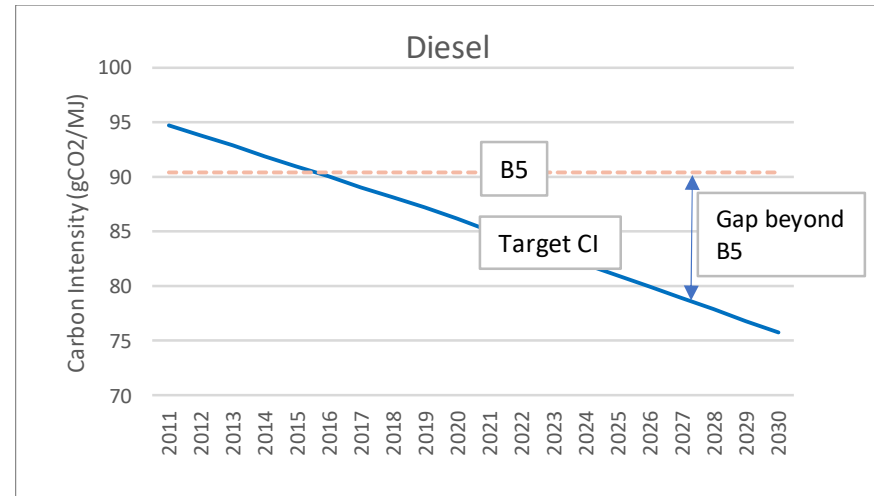
Biofuel Substitution



Potential to reduce CI by 80% with renewable feedstocks

LCFR Background and History

- Regulation tends to drive biofuel substitution
- Existing US and Canadian federal regulations was already pushing ethanol and biodiesel blending
- Normal limits of 10% ethanol and 5% provided compliance until about 2016
- Renewable Diesel is the only commercial scale biofuel available to go beyond this
- Compliance pooling – RD blending generates credits for gasoline compliance



BIOFUELS PRODUCTION?

Low-Carbon Fuel Regulations are driving major change in the liquid fuels industry

Primary compliance pathway is substitution of conventional fossil fuels with biofuels

	Substitution Rate Canada	Substitution Rate BC
Ethanol	8.2 % of gasoline	9.2% of gasoline
Biodiesel	1.3% of diesel	2.8% of diesel
Renewable Diesel	0.9 % of diesel	4.5% of diesel

As a refiner your purpose is to make transportation fuel

Refinery Conversions to Double US Biofuels Output

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Renewables / Oil & Gas / Energy / Commodities

Imperial Oil greenlights \$720 million to build largest renewable diesel plant in Canada

Plant expected to produce more than one billion litres of fuel a year using vegetable oils

Ottawa spending \$86M on Come By Chance refinery's conversion to biofuels

Construction should be completed by end of 2023, says Braya president

CBC News · Posted: May 31, 2023 12:11 PM PDT | Last Updated: May 31

“Refinery Conversion” is not a good name

Parkland's Approach

Renewable Diesel

- Purpose built vendor supported
- Feeds limited to fats, oils and greases
- Pure renewable diesel product

Low Risk / High Cost

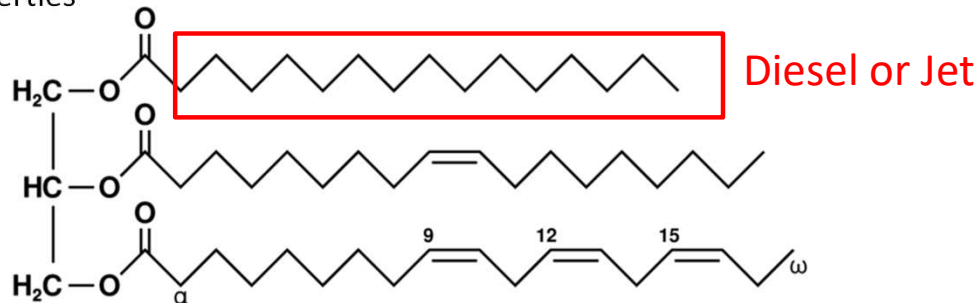
Coprocessing

- Bio-feed into existing refinery units
- True adaption of existing refinery units to renewable feed
 - Process units, tanks, utilities, control systems
- Parkland has developed this technology in-house
- Bio-products comingled with conventional

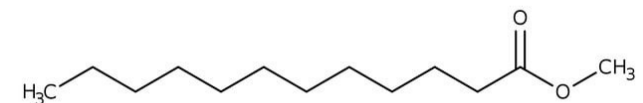
High Risk / Lower Cost

Lipids (Fats, Oils and Greases)

- Animal and Vegetable fats are key for bio/renewable diesel production because of availability and properties



Biodiesel (FAME) – Cover up the oxygen

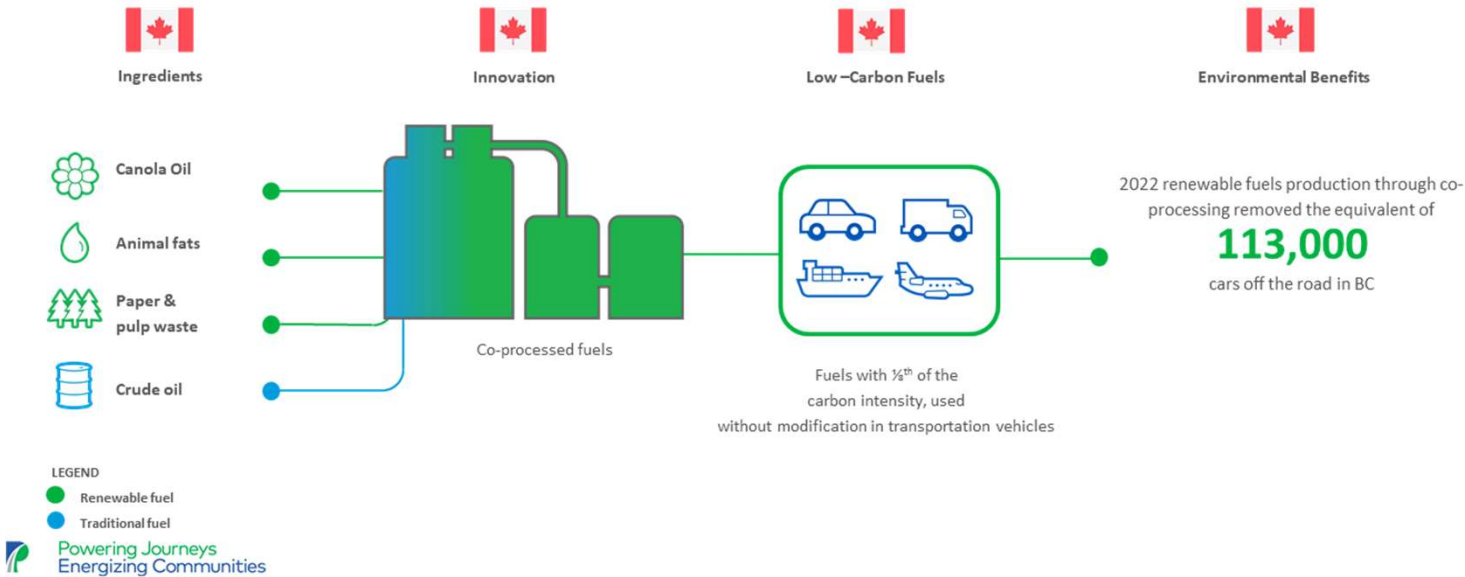


Renewable Diesel (HDRD, RD, HEFA, HVO) – Remove all the oxygen

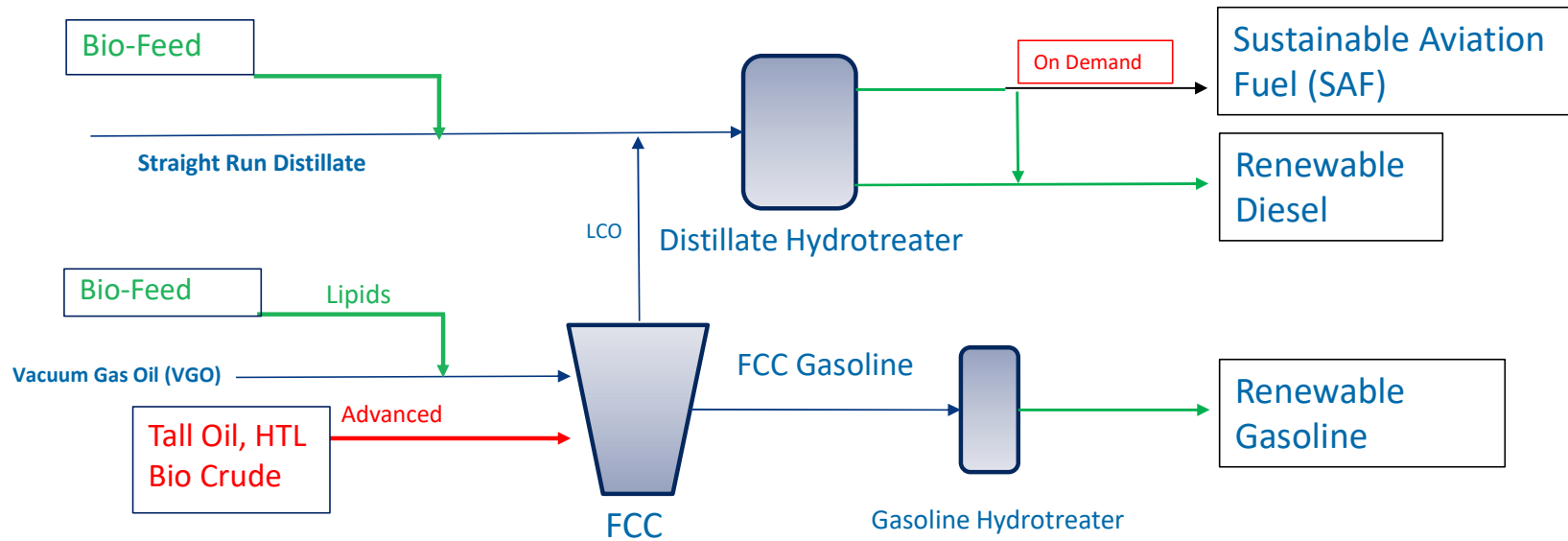
	Petroleum Diesel	Biodiesel (FAME)	Renewable Diesel (HDRD, HVO, HEFA)
Origin	Crude Oil	Fats, Oils and Grease	
Oxygen	Zero	15%	Zero
Cold Weather Performance	Compatible	Limitations	Compatible
Typical CI (gCO ₂ /MJ)	90	10	30
Cost		<Diesel	>>Diesel
Aromatics	10% - 30%	Zero	Zero

WHAT IS CO-PROCESSING?

- Processing renewable feedstocks like **canola oil and oil derived from animal fat** (tallow) alongside crude feedstock to produce renewable fuels with lower carbon intensity and GHG emissions.
- **Leverage existing refinery infrastructure** and technical expertise to facilitate commercial-scale production of renewable fuels

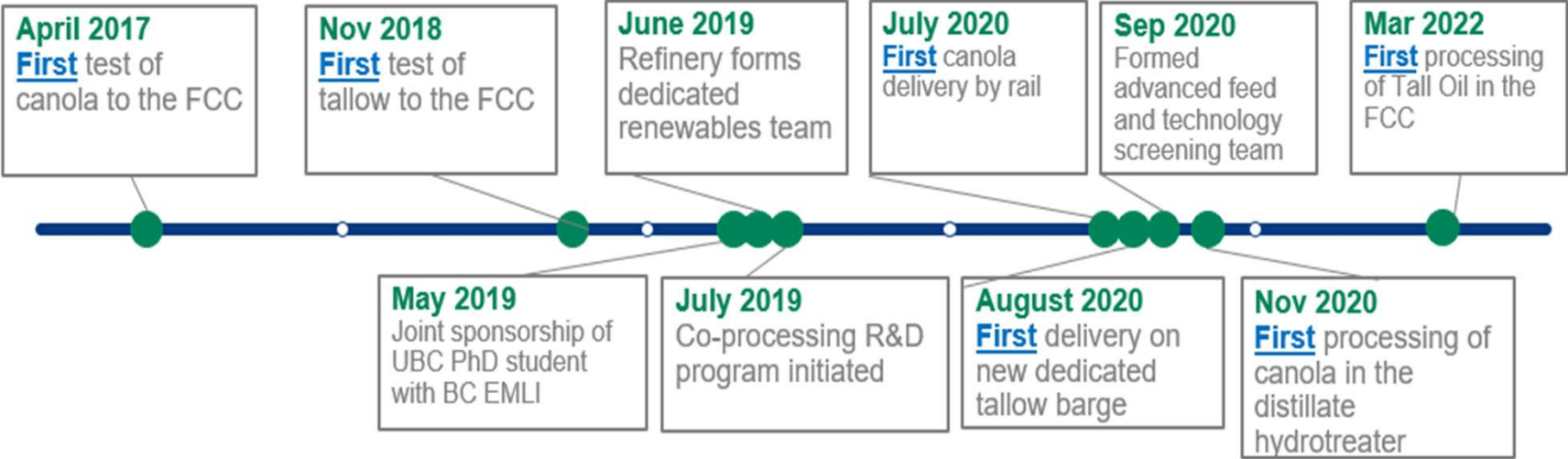


WHAT IS CO-PROCESSING?

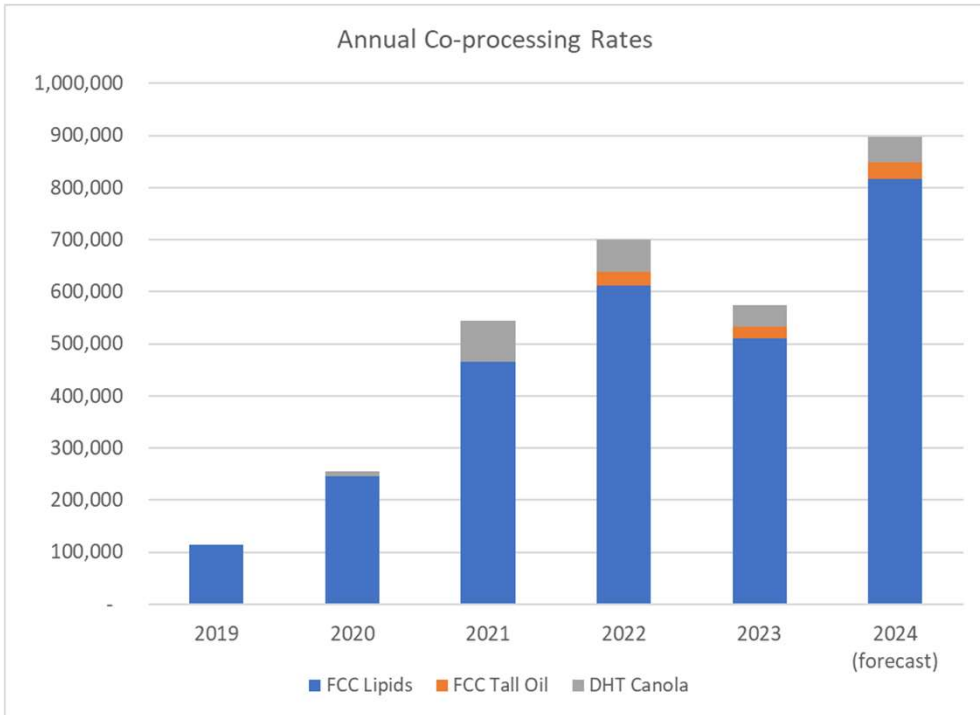


- Two coprocessing units
- FCC Provides feed flexibility
- Renewable Gasoline and SAF

RENEWABLE PRODUCTION DEVELOPMENT TIMELINE



PARKLAND TOTAL ANNUAL CO-PROCESSING RATES



Year	Total Feed (bbl)	Renewable Fuels Produced (L)
2019	114,000	14 M
2020	272,000	36 M
2021	545,000	72 M
2022	701,000	92 M
2023	580,000	77 M

Feedstocks

Seed Oils



Waste Fats



Non-Lipid



COLLOBARTION AND INNOVATION – Too small to do this on our own



- Innovation ahead of regulation
- Co-sponsorship of local graduate students

INDUSTRIAL RESERACH



ADVANCED FEEDSTOCKS



Moving biofuel usage forward in transportation

