



Biofuel Production Adaptability and Responding to Market & Policy Demands

What is required to increase liquid biofuels production in Canada and how can it serve to economically and ethically reduce GHG emissions from the vehicle fleet while supporting communities?

Who:

[America's farm economy - An uncertain future?](#)

Agri-Pulse - 25 October 2016 By Doug Keesling. Most Americans are unaware that U.S. farmers today are facing an uncertain financial future, and that our farm economy is the brink. Unless they work in agriculture, most Americans probably don't know, for example, that one of the basic building blocks of the farm economy-U.S. grain prices-have plummeted in recent years. The bottom line is this: If things don't change-and soon-the future does not look bright for America's farm economy.



[Ethanol will help Colorado corn producers add diversity to the farm](#)

Greeley Tribune - 24 October 2016 By Bridgett Weaver. Val Dolcini of the Farm Service Agency said USDA's Biofuels Infrastructure Partnership helps give farmers the option to grow corn for ethanol, which helps them diversify their farm — an important business move for many farmers right now with most commodities resting at very low prices.



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What:

Demand:

- Annual (mandated) demand – not daily or even monthly

Supply:

- Annual DOMESTIC capacity

RFS Volumes (in red):

- Does not reflect voluntary blending (O&G customers reluctant use)

Ethanol use:

- Rapid rise with RFS mandate as inexpensive octane additive
- Retail infrastructure in place except for higher blend (E15 and E85 requests in place)
- In 2013 ethanol trended on average 20cpl cheaper than gas however in downturn situations, is more expensive than gas to blend

Capacity:

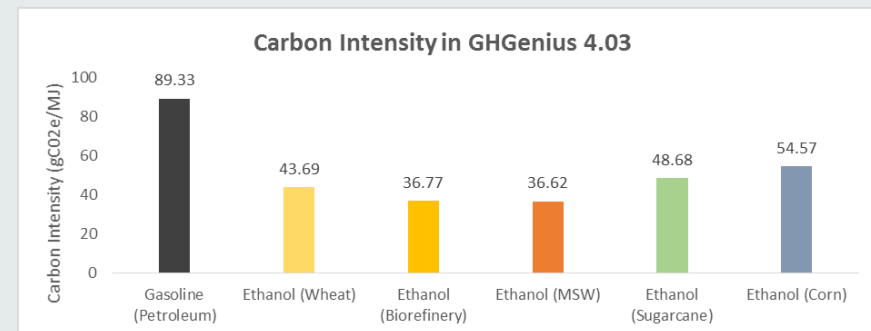
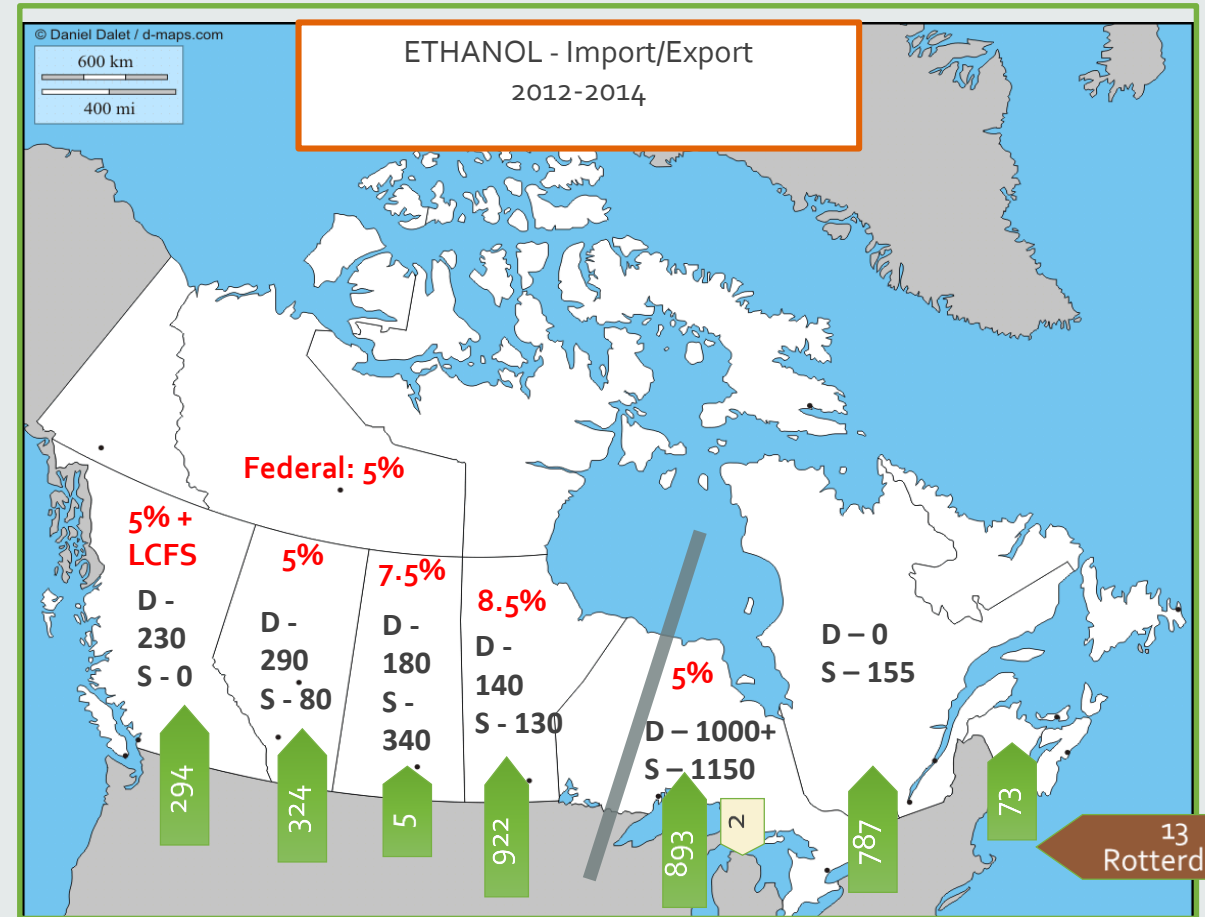
- Under-supply in Canada

Potential growth:

- Octane blending (E10) all post 2001 vehicles
- Mid-level blends (E15/E30) more environmentally beneficial (US EPA)
- High-level blends (E85) Flex Fuel Vehicle use
- Low carbon feedstock ethanol (feed wheat, barley, waste, wood, etc.)
- Advanced & cellulosic

GHG Reductions:

- Varies by process technology & feedstocks
- **Biofuels reduces 4.2 MEGATONS of carbon emissions every year – the equivalent of taking 1 million cars off of the roads!**



Generic values here are not plant specific

Where:

Currently no incentives in Canada to produce advanced or cellulosic biofuels. All fuels including gasoline should have a carbon intensity rating and be priced accordingly.

Jurisdiction	Offset Program	BPP*	BC LCFS	CA LCFS	RINS	Transport Costs
Alberta	X	X				Low
BC			X			Mid
US					X	High
California				X	X	Very High

* Newly announced Bioenergy Producers Program reuses carbon funds to transition to a low carbon economy

REACH
HIGHER



Why: Basic Pillars of Biofuel Production

Energy

- 113 Octane vs. Gas at 85*
- Low Cost vs. Gas/Toxic Additives
- Conservation of Natural Resources (O/G)
- Domestic Energy Security

Environment

- Air Quality
- Canada Emission Trends
- Human Health
- MSW feedstock
- 2017 Café Standards
- Leadership

Rural Communities

- Farm Resiliency/ Diversification and Sustainability
- Not food vs. fuel; Fuel THEN Food
- Spoiled Grain Usage
- Rural Employment
- Forestry Feedstock

Advanced Education

- Partnerships w/acadamia
- Canadian Infancy
- New Technology
- Green JOBS

* Average



Why Now:

EXCEED
EXPECTATIONS

Lifecycle Analysis – Wells-to-wheels accounting considers emissions that are created during the entire lifecycle of a fuel, from the wellhead where the oil is extracted to the vehicles or other end-uses where the fuel is consumed. Emissions occur throughout the lifecycle of a fuel - during production, processing and refining, transport to market and consumption (e.g. operating a vehicle). As demonstrated by the chart below, the vast majority of emissions from fuels come from vehicle use.

TYPICAL PROPORTION OF TOTAL CRUDE OIL FUEL LIFECYCLE EMISSIONS ³¹



31. Adapted from Jacobs Consultancy – EU Pathway Study: Life Cycle Assessment of Crude Oils in a European Context, March 2012.

Why Not? Characteristics and Market

Feedstocks: Liquid biofuels including ethanol, methanol, biodiesel and other renewable fuel alcohols are created from sustainable feedstocks that may or may not include cereal grains. All drop in fuels must be certified to meet fuel-grade ASTM or Canadian General Standards Board specifications in order to be usable.

Biofuel benefits: 24/7 reductions in transportation fuels TODAY with a human health component

GHG savings: There can be no climate solution without the transportation sector which has grown by 50% in Alberta alone between 2004 and 2015 (CLDD page 37).

US Sector Drivers: Growth and Leadership

CDA Sector Drivers: GHG Reductions and Diversification

LEAD THE
WAY



Why Not? Ethanol Sector Challenges:

- Pricing and market competition with other jurisdictions primarily the US due to our lack of import regulations. Often incoming ethanol does not meet GHG targets or indirect land use requirements in the US so it is 'dumped' cheaply into Canada to meet our mandates.
- Market distortions in competitive jurisdictions and other energy products; production incentives, fiscal (tax) incentives, capital programs, and premiums from mandates (to be discussed later).
- Commodity volatility and costs - based market is extremely challenging to negotiate based on significant price volatility, shifts in global supply and demand, weather and climate uncertainties and a level of uncertainty related to policy directions and regulations (NRCan Clean Technology in Canada paper 2016). Feedstock is expensive and ethanol tracks CBOB corn instead of RBOB or local rack pricing.
- True market pricing is not reflective of full price of carbon nor human health component.
- No mechanism to honor continuous outputs with environmental benefits and to attract capital.



How:

	Grade	Choice	Runs	Spoiled	Husks/ fiber	WDG	CI	Advanced
Wheat/ Rye/ Triticale	Feed	First	Mid	Yes	Yes	Second	Best	Yes (US)
Barley	Feed	Second	Worst	Yes	Yes	Third	Mid	Yes (US)
Corn	Feed	Last	Best	Yes	Yes	Best	Worst	No
Waste wheat starch	NA	First	Continuous	NA	NA	Worst	Best	Yes (All)
Waste barley/ corn starch	NA	Purchase cost	Occasionally	NA	NA	Worst	Best	Yes Barley

Also have bench and full scale trials of other feedstocks such as sugar beets, molasses, waste from pop manufacturers and beer distilleries, waste from dairy, straw, etc.

How do we continue to build on our successes in the future?
1st generation and beyond!
(Or what affects your carbon intensity scoring...)

- Anaerobic digestion – biogas and green power generation as well as feedstock/
digestate to and from feedlot
- Waste streams for ethanol production
- Cellulosic biotransformation technologies (very expensive/demo stage)
- Cogeneration
- Co-location with other bioenergy or traditional plants
- Etc...

‘Support for renewable fuels is support for farmers, rural communities and our economy’. –
Hon. Gerry Ritz, Minister of Agriculture

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Final thought:

Why we need it – why you need it.

Time to invest in our future.

Time to 'rebrand' Canada.



'In Canada, we also believe in new age biofuels where we can use agricultural waste and waste products to produce biofuels. It is an important part of the solution to address energy security and the environment". – Hon. John Baird, Minister of the Environment



Thank you!

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