



CELLOSIC ETHANOL

IGPC Ethanol Inc.

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IGPC Ethanol Facility



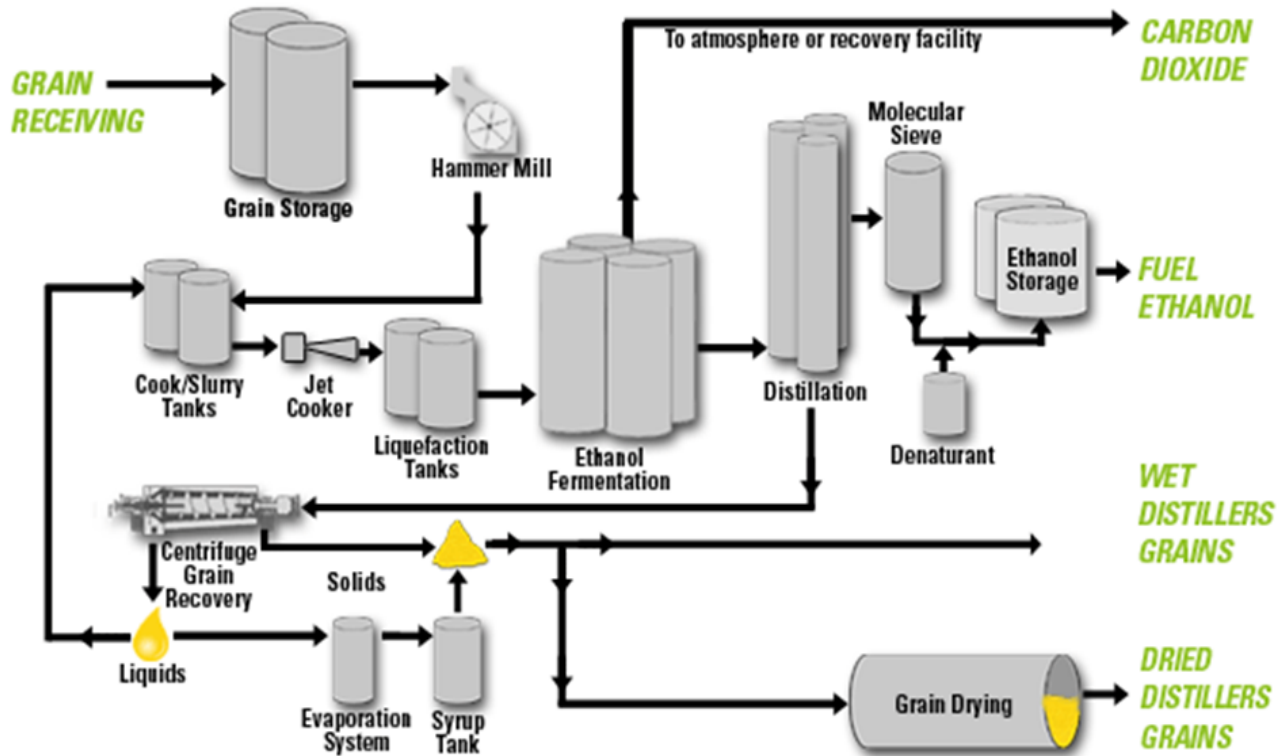
- Located in the Town of Aylmer in Elgin County
- First generation corn to ethanol plant
- Grinds 16M bushels of corn per year
- Maximum production rate of >170M litres of denatured ethanol per year, and 120k tonnes of distillers grains



IGPC Process



Ethanol Production *The Dry Mill Process*



IGPC Timeline



- 2002 – Project Initiated
- 2007 – Plant Commissioning
- 2008 to Present
 - Preparation for operating grant expiration 2016/17
 - Projects complete or underway
 - Oil extraction, Selective Milling, Fiber Separation, Steam Turbine, Cogeneration



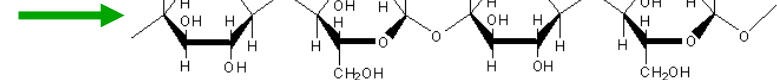
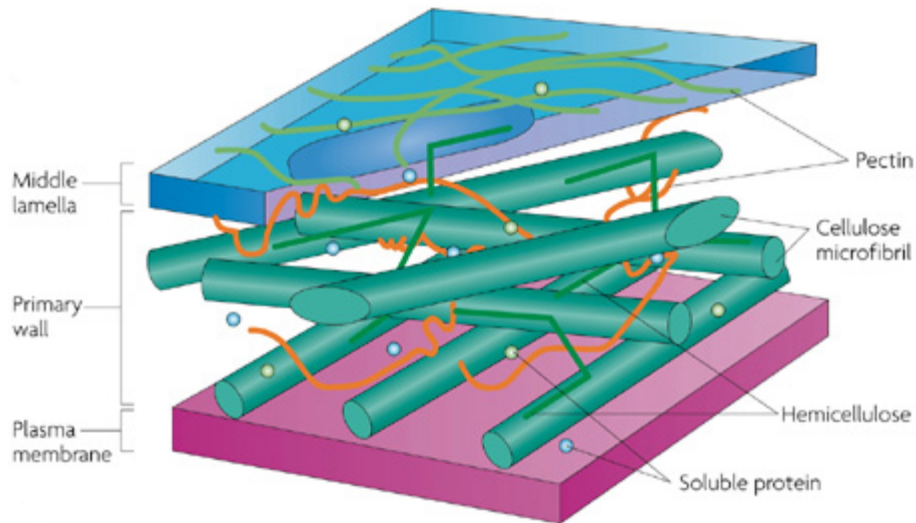
- Recent investment into ICM's Fiber Separation Technology
 - Increase in ethanol production
 - Removal of 45,000 MT corn fiber prior to fermentation



Cellulosic Ethanol



- Second generation biofuels and transition to biorefinery to generate new revenues
- Corn fibre and other feedstocks contain C5/C6 sugars in their cell walls



Source: Sticklen. 2008. Plant genetic engineering for biofuel production: towards affordable cellulosic ethanol. *Nature Reviews Genetics*, 9: 433-443.

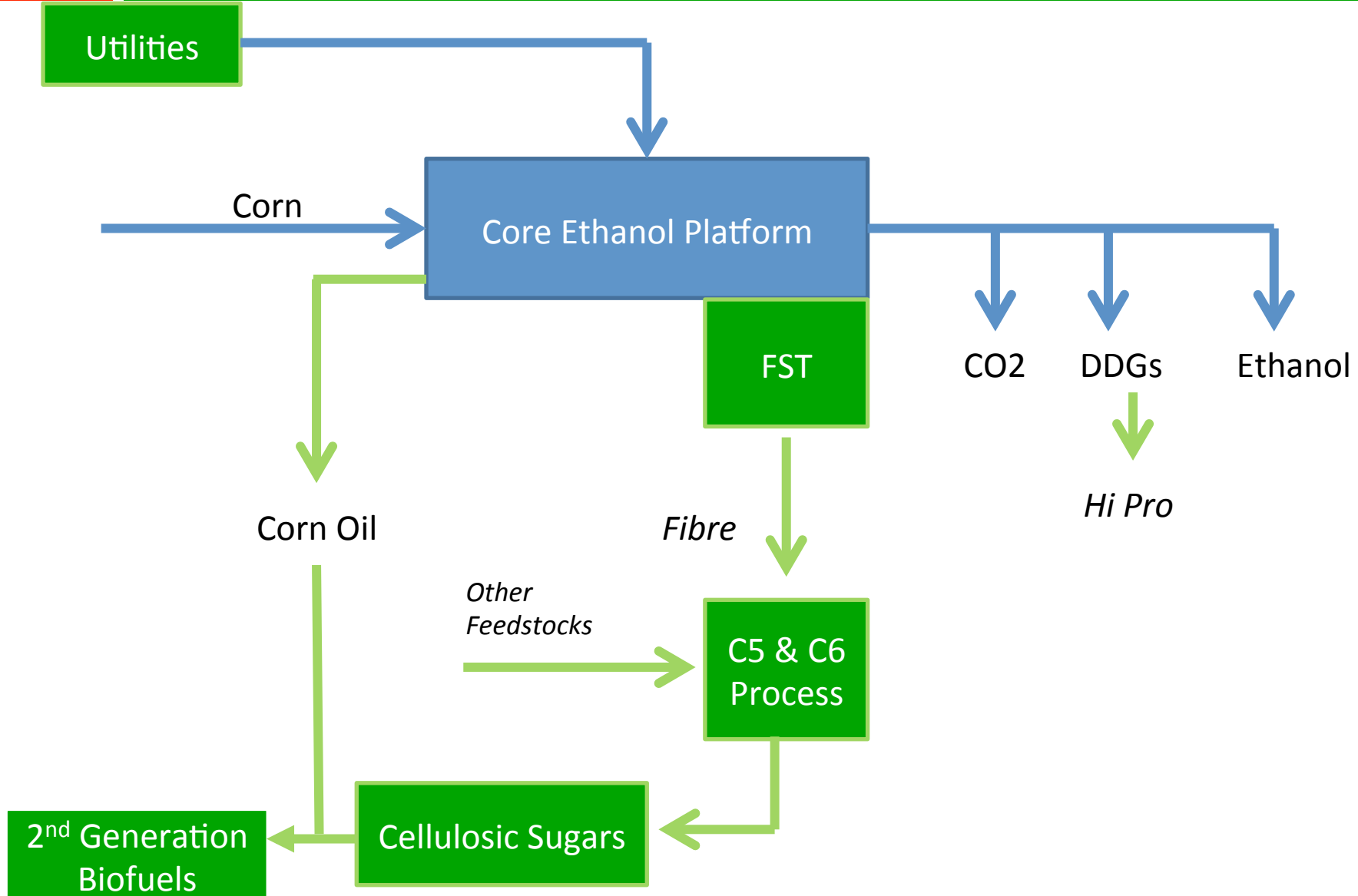
Technology



Providers

- Technical due diligence
 - 9 technologies were assessed. Common steps include:
 - Acid hydrolysis (pH, residence time, temperature)
 - Mechanical or physical process (heat, pressure, steam, supercritical water) to remove hemicellulose
 - Enzymatic hydrolysis of glucan chains
 - Other considerations: CAPEX/OPEX, Stage of technology development, IP

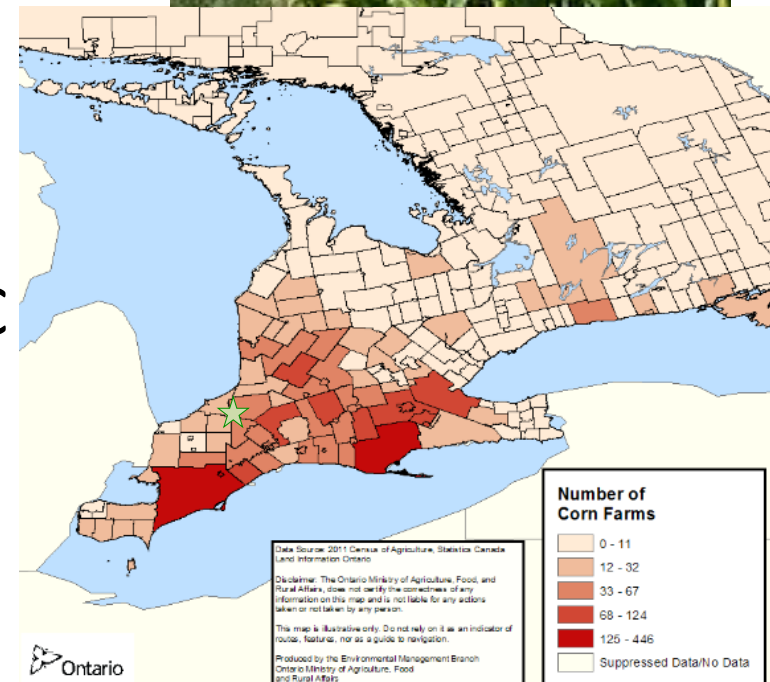
Summary



Other Feedstocks



- IGPC is located in SW Ontario, surrounded by abundant supplies of feedstock (ie corn stover)
- 1.8mm acres field corn in Ontario as per five year average from OMAFRA crop statistics
 - >8mm MT
- Majority grown surrounding IGPC yield ranging between 160-170 bu./acre



Future Feedstocks



- Purpose-grown biomass

Feedstock	Cellulose (%)	Hemicellulose (%)	Lignin (%)
<i>Miscanthus</i> sp. ¹	43 - 52	24 - 34	9 - 12
<i>Panicum</i> sp. ²	33	25 - 26	17 - 18
Corn Stover ³	30 - 50	20 - 40	15 - 25

¹Brosse et al. 2012. *Miscanthus*: a fast-growing crop for biofuels and chemicals production. *Biofuels, Bioproducts & Biorefining*, 6: 580-598.

²Keshwani and Cheng. 2009. Switchgrass for bioethanol and other value-added applications: a review. *Bioresource Technology*, 100: 1515-1523.

³South Dakota State University. 2007. Composition of herbaceous biomass feedstocks. Available at: <http://ncsungrant.sdstate.org/uploads/publications/SGINC1-07.pdf>



Thank You

