ZeaChem

Made by Nature, Refined by ZeaChem

Biomass In, Bio-Chemicals & Fuels Out

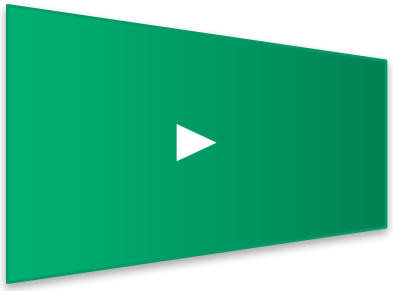
Accelerating The Path To Commercialization @ ZeaChem Technology Institute (ZTI)

Zac Mitchell, Commercial Development Manager

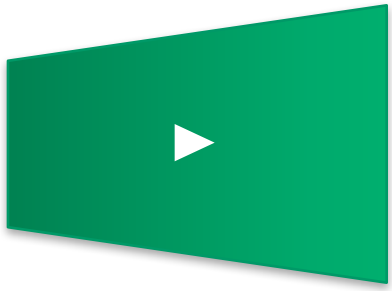
ABLC Feedstocks 2016

Biorefining Process Flow Diagram

biomass

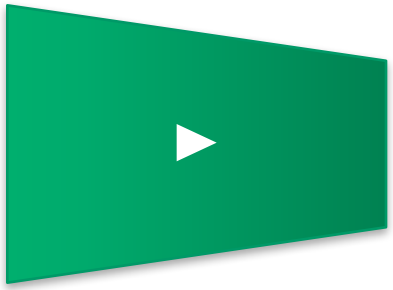


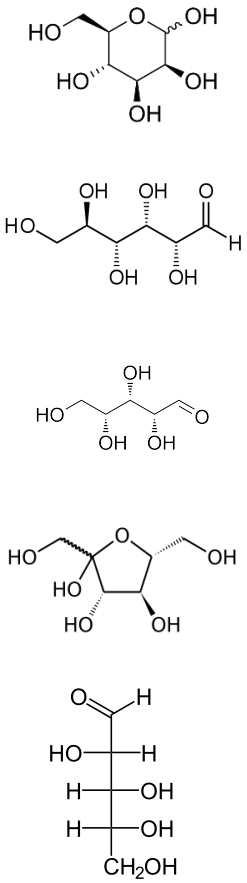
sugar

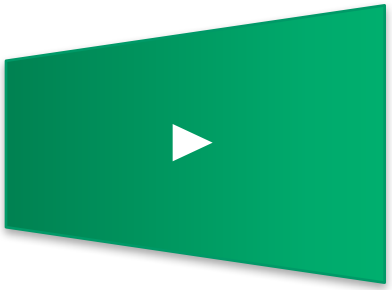


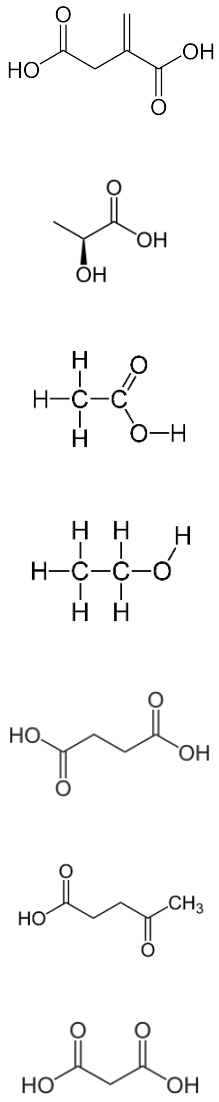
bio-fuels & chemicals

Biorefining Process Flow Diagram









Tremendous Sources of Variability in Each Part of The Process, Additional Variability as You Increase Scale

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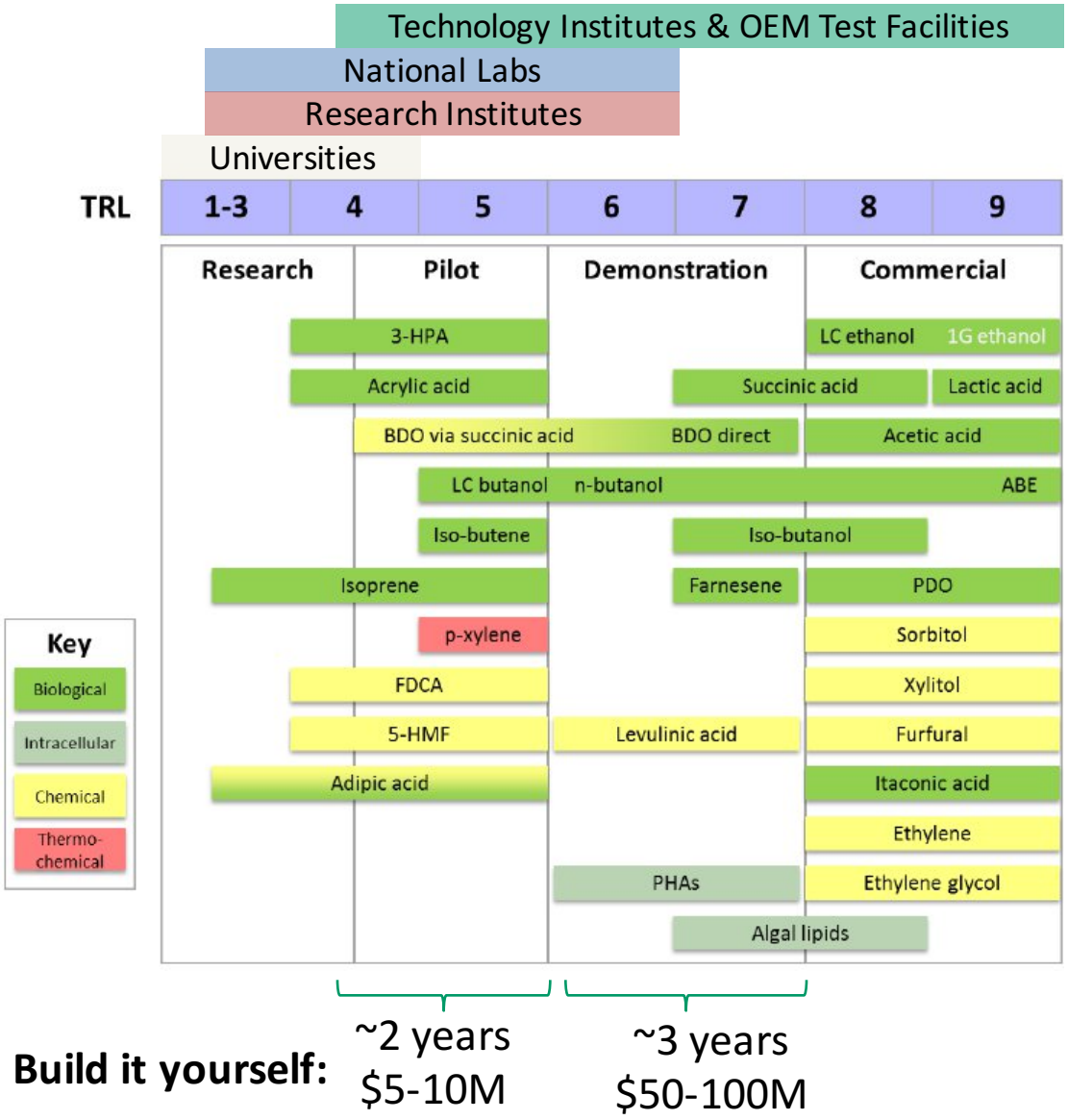
For Technology Readiness Levels Of 8 Or Less, There Are Options



Build it yourself:

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Chart Source: E4tech, 2015. From the sugar platform to biofuels and biochemicals.

The Technology Development Support Landscape

ZeaChem Technology Institute – Boardman, Oregon

ZTI – Fully Integrated Semi Works Lignocellulosic Biorefinery

Pretreatment System *Fermentation System* *Recovery System*

Thermal, Chemical and Enzymatic Hydrolysis

Pilot Fermenters
(4, 40, 400x2 , 4,000 gal.)

Filtration

Hydrogenolysis

Demo Fermenters
(40,000 gal. x 3)

Solvent Extraction, Esterification/Distillation

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Case Study – Lignocellulosic Biomass – The Challenge

- Every feedstock is different
  - Sugar content
  - Solid:Liquid
  - Co-products (waste products)
  - Inhibitors

- Feedstock baskets/formats are different
  - Growth & harvesting
  - Material handling considerations
  - Hydrolysis requirements

- Feedstocks differ by time of year
  - Compositions

Case Study – Lignocellulosic Biomass Supplier

- Lignocellulosic Biomass Supplier is interested in determining the efficacy of its biomass as a 2nd generation sugar supply to the biochemical and biofuel industry.
- Plant visit and engineering design review are conducted to establish how best to introduce the biomass into ZTI's pretreatment equipment
- ZTI runs a variety of agreed upon pre-treatment approaches (auto-hydrolysis, steam explosion, dilute acid hydrolysis, sulfite, etc.) to produce C5 rich sugar pretreatment hydrolysate and substrate followed by thermochemical or enzymatic hydrolysis of the substrate to produce C6 rich sugar hydrolysate and lignin. ZTI samples, tests and provides analytical data on the resultant materials.
- In the span of a few months, Lignocellulosic Biomass Supplier has tons of C5 sugar, C6 sugar and lignin for its thermochemical, catalytic and fermentation biorefinery customers to test.

The Consequences of Working Together

This		Instead of This
	Physical Assets	
	Operations Resources	
	Cost	
	Time	
	Commercial Project Development	

Thank You

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