



Cellulosic Sugars in Corn to Cellulosic Migration (CCM) and Other Technologies

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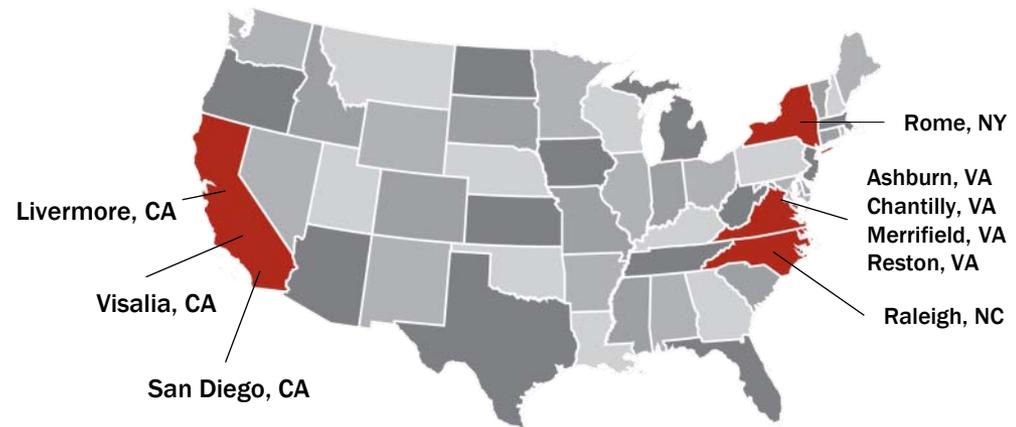


Logos Technologies Delivers Innovative Systems Solutions



- Just under 200 employees
- Founded in 1996
- Privately held under consistent leadership
- Headquarters: Merrifield, VA
- Locations in four states nationwide
- Four divisions
- A variety of government and commercial customers
- Core competency is innovative science and technology systems integration

Logos Locations



Corn to Cellulosic Migration is a Large Portion of Logos Technologies' Portfolio



Metrics

- 70 gal ethanol per ton of feedstock to demonstrate commercial viability
- 2 ton/day of feedstock processing
 - Corn stover
 - Switchgrass
 - Woodchips
- 80% GHG reduction to demonstrate sustainability
- Analyze feedstock logistics
- Novel approaches to
 - Saccharification
 - Fermentation
 - Separations



Partnerships

- Biomass Program Integrated BioRefinery Platform
- Partnership with major technology provider Edeniq
- LCA partner is UC Davis
- \$20M DOE share
- Budget Period 1
 - Design
 - *Complete*
- Budget Period 2
 - Build (ribbon cutting June 26, 2012)
 - Demonstrate operation
 - *In progress*
- Critical Decision 4
 - Operate
 - *In process*



Edeniq

UCDAVIS

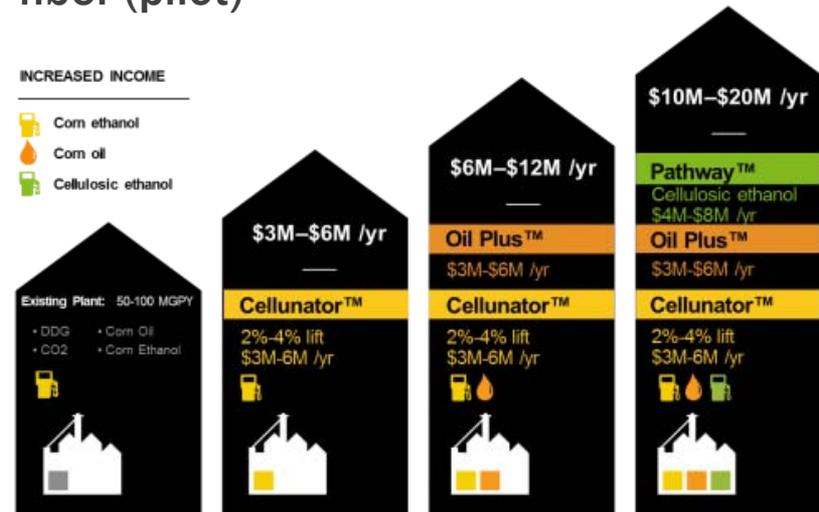


Overview

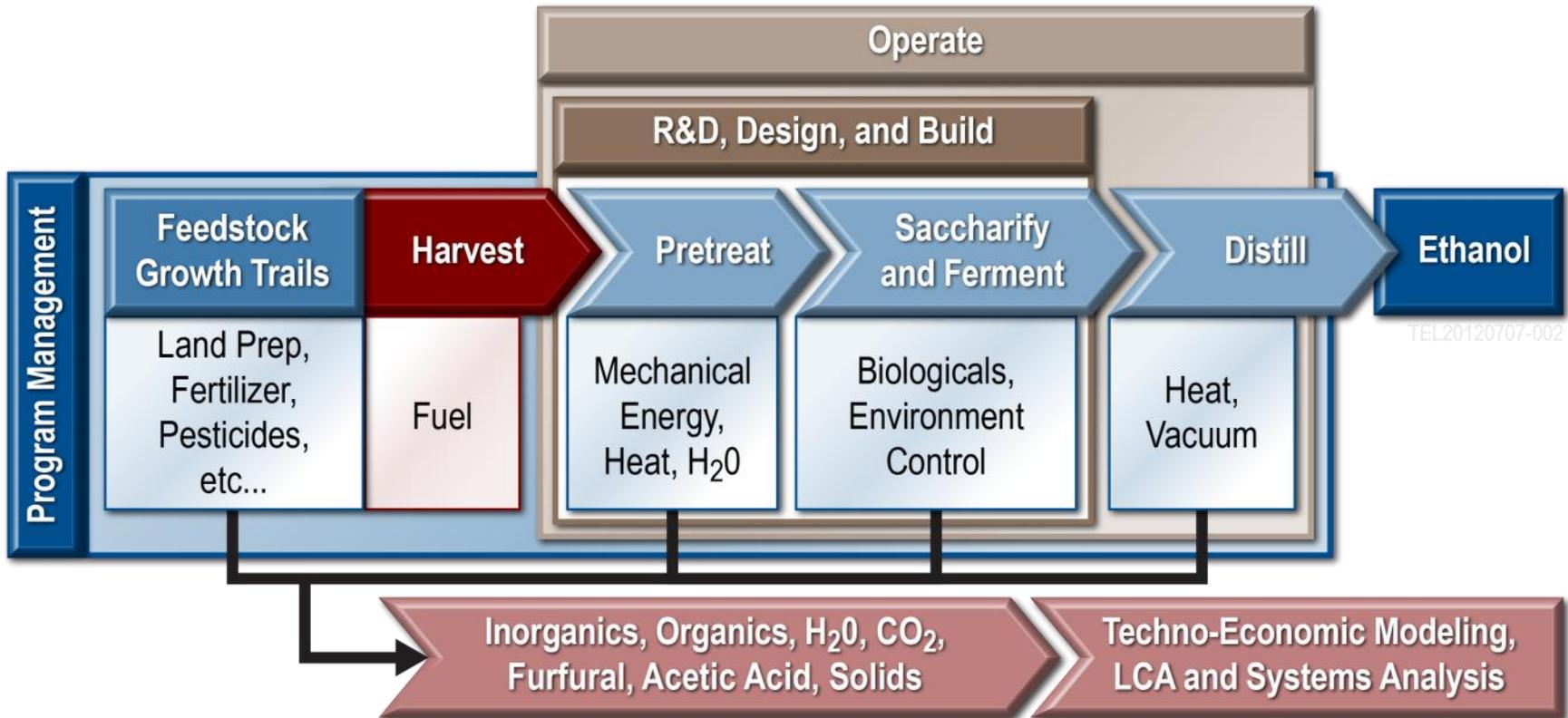
- Company formed in 2008
- State-of-the-art R&D center in Visalia, CA
- Sales and technical service in Omaha and Brazil
- Over 85 employees worldwide (US and Brazil)
- Financed by leading VCs and DOE

In Addition to Cellulosic Ethanol

- Optimization of existing ethanol plants
 - **Cellunator™** – improves yields; higher starch conversion (commercial)
 - **Oil Plus™** Corn Oil Extraction – higher, reliable recovery (commercial)
 - **Pathway™** – cellulosic ethanol from corn fiber (pilot)



CCM is Design/Build/Operate 2 TPD Cellulosic Ethanol Biorefinery

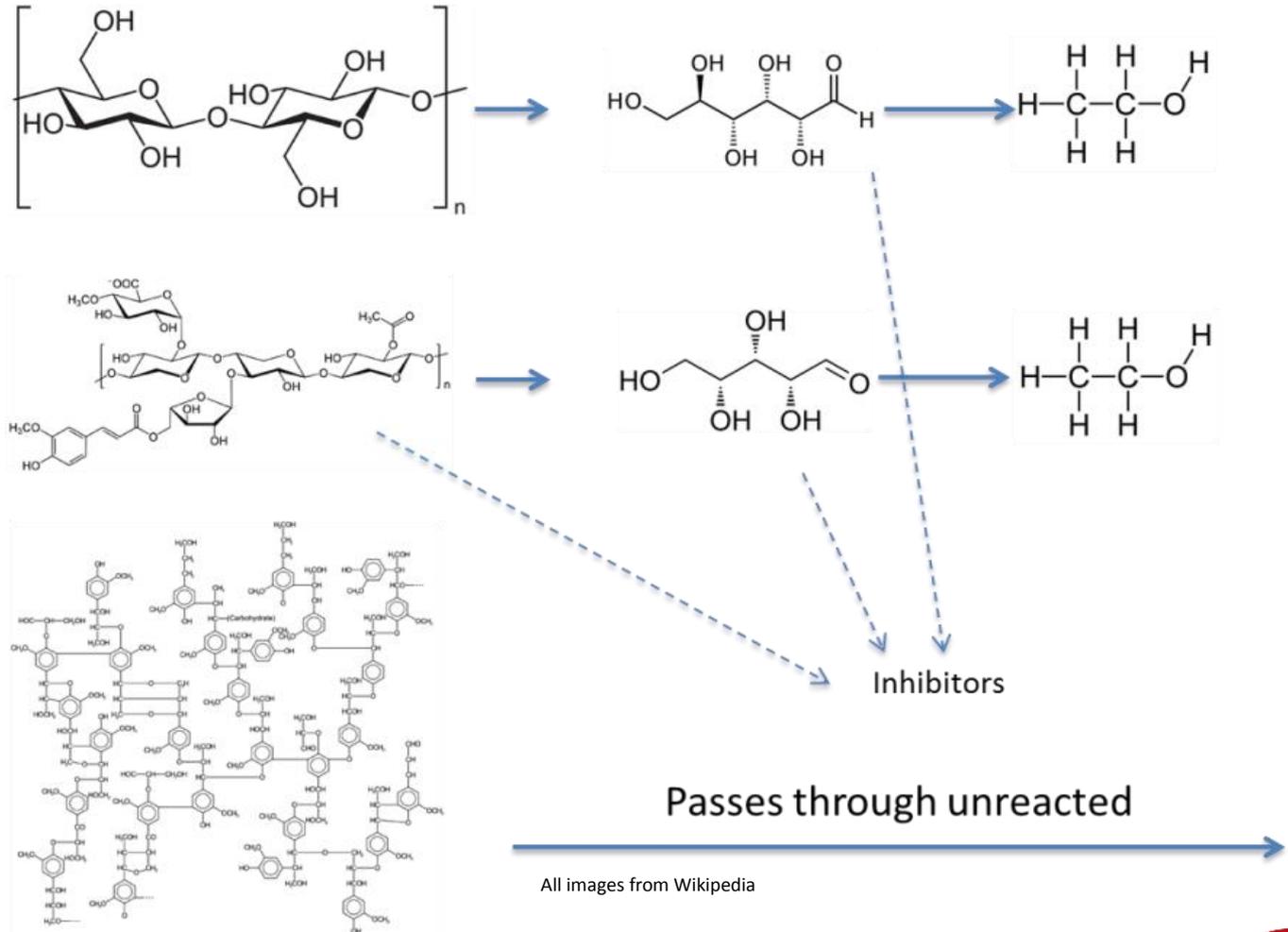


Sugars are a Key Intermediate in Our Cellulosic Ethanol Process



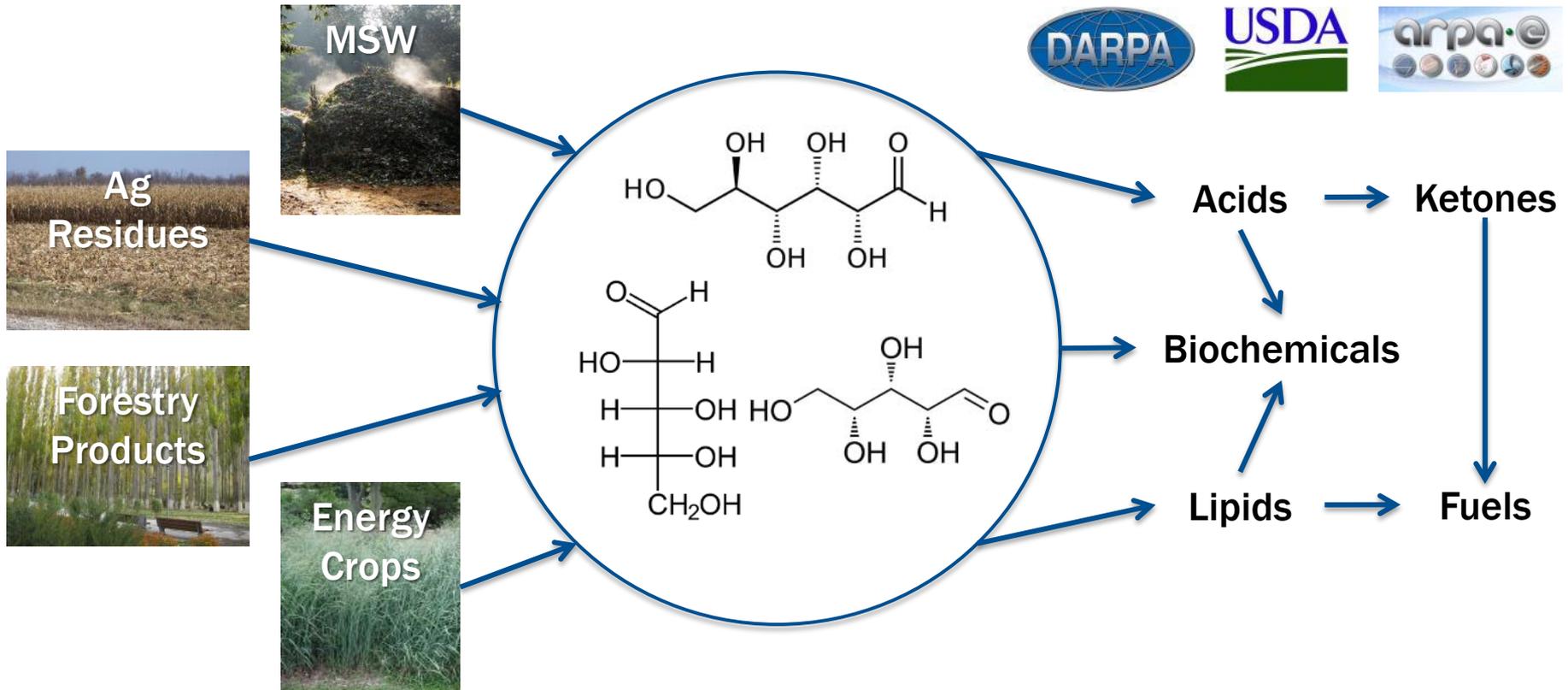
Innovations

- Cellunator™ Mechanical Pretreatment — Water Recycle Advantages
- Simultaneous Saccharification & Co-Fermentation



All images from Wikipedia

Logos has Other Fermentation Pathways Through Sugars



All images from Wikipedia

Biochemistry is now doing what chemistry used to do → **Cost effective cellulosic sugars will enable non-food, renewable bioproducts**



Barrier: Complexity

- Lignocellulosic feedstocks are, by definition, complex materials
- The variety of available feedstocks increases complexity geometrically



Opportunity

- How to convert a complex material to a clean fermentable feedstock?
- Can a single process handle a variety of feedstocks?

**Niche Commercial Opportunities...
But a 1 Trillion GPY Market Provides
Attractive Niches for Systems Integrators**