Levulinic Acid Ready for Commercialization

BIO Conference May 2015
Renew
Segetis believes that biobased materials are a viable alternative to petrochemicals and contribute to improving quality of life

Renew.Reinvent.Sustain.Change the World™

Reinvent
Our disruptive technology will turn Levulinic Acid’s potential as a Biobased Building Block into reality

Sustain
Supporting sustainable lifestyles by transforming Levulinic Acid into high performance materials reducing toxicity, air and environmental impact

Change the World.
Levulinic Acid Is An Important Renewable Building Block

1st Generation: Sugar

2nd Generation: Cellulosic Sugar

C5 backbone: Renewable feedstock for petrochemicals adversely impacted by shale gas economics

Built-in oxygen: Naturally provided via photosynthesis rather than expensive chemical processes

Dual keto-acid functionality: Wide range of potential derivatives for novel and commodity materials

Favorable LCA
Segetis: Scaling up and De-risking the Path Forward

- Defined markets and timelines
  Cost-effective performance in use

Market

- Engineering studies
  Piloting
  Feedstock evaluation

Scale Up

- Levulinic acid process
  Levulinic ketal product

Economics

- Scalable process
  Financing for plant
  Supply chain

Technology
Segetis has Proven Levulinic Acid Technology

Segetis Pilot 2013-2014: >2500 hours of run time to date
Target economics demonstrated for all unit operations
Engineering studies in progress for commercial scale
Process is feasible for second generation sugars
Commercial Scale Facility in 2016

Pilot - 2009
Levulinic acid and ketals fully piloted

Demonstration Plant
Operational – 2012
Commercials supply of levulinic ketals for strategic customers

Commercial Facility
Planned - 2016
Integrated levulinic acid and ketal facility for commercial supply

Segetis™
Funding the Commercial Facility

- IRRRB approved $28 million funding package for a build in Hoyt Lakes, MN
- MN Power (Allete) committed $3 million for utility plant upgrade
- Detailed Engineering to commence in early 3Q14
- Segetis will complete the balance of the funding stack through project debt and equity financing
First commercial facility: plasticizers and formulation aids
Low-cost levulinic acid opens drop-in chemicals
Market: Plasticizers for PVC

Drivers for Change:
- Regulation of phthalates use and consumer demand for safer plasticizers

Segetis Value Propositions:
- Phthalate-free, durable, biobased, competitive pricing, easier processing, broad product portfolio for all major application segments

Market:
- Addressable $14bn, CAGR: 1-3%

Replace the **phthalic anhydride** core with **levulinic ketal** core
Segetis is developing plasticizers for multiple PVC applications

Choice of R groups drives plasticizer performance

![Phthalate](image1)

![Levulinic ketal](image2)
Agrochemical Market

Drivers for Change:
- Regulation - Phase-out of toxic solvents
- High cost to develop actives is driving formulation innovation and need for high-performing solvents
- Sustainable farming – impact on soil and water

Segetis Value Propositions:
- Dissolves multiple active ingredients in formula
- Enables higher concentration formulations

Market:
Addressable $1bn, CAGR: 8-9%

Formulation work in HI&I translates to the Agrochemical industry
- Solubilization of actives: multiple actives to manage pest and weed resistance
- Highly concentrated formulations: reduced packaging & shipping costs
Polyamide Market

Drivers for Change:
Consumer trend towards natural/biobased materials
Competitiveness of naphtha vs. shale gas

Segetis Value Props:
Enable exploitation of biobased routes to existing intermediates
Long term cost improvement for naphtha players
Meet increasing demand for sustainable materials with improved carbon footprint

Market:
Addressable $8bn, CAGR: 2-3%

Bio-route to nylon developed by Invista, DSM, and BASF using standard catalyst systems and processes

Levulinic acid → alkenoate → Nylon intermediates (adipic acid, caprolactam)
Segetis Highlights

Diversified renewable chemical company addressing $50Bn Market

Levulinic acid and ketal derivative technologies have been fully piloted

Secured $28 million initial funding for commercial plant

First commercial scale plant targeted for 2016
Levulinic Acid......

La La Lala ..... 

Life is Good.....