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Analyzing the Bankability of Emerging Bioenergy Technologies

Andrew Soare, Analyst

Lux Research, Inc.

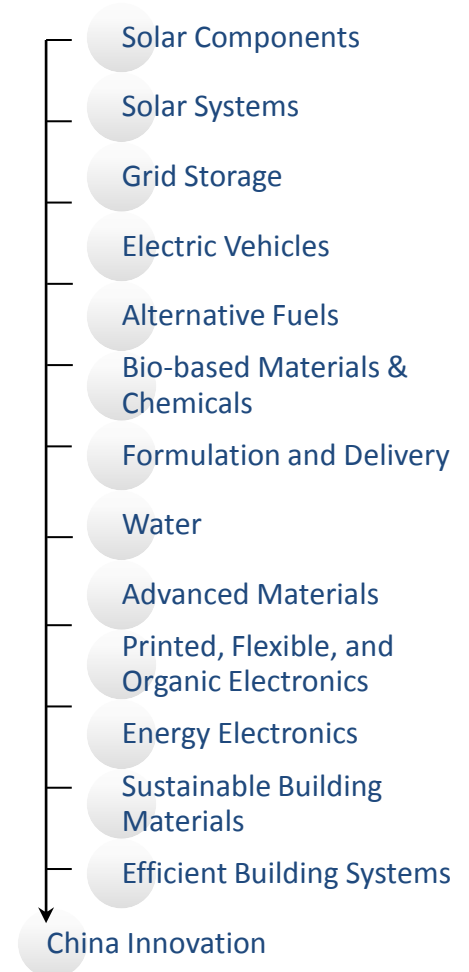
Pacific Rim Bio Summit

October 10, 2012

About Lux Research

- Helps clients find **new business opportunities** from emerging technologies in physical and life sciences
- Offers ongoing **technology and market intelligence**, as well as market data and consulting services
- Over **250 clients on six continents** – multinational corporations, investors, governments, and SMEs
- **Global reach**, with over 80 employees in Boston, New York, San Francisco, Amsterdam, Singapore, Shanghai, Seoul, and Tokyo
- Combines deep **technical expertise** with **business analysis** to support strategic decisions

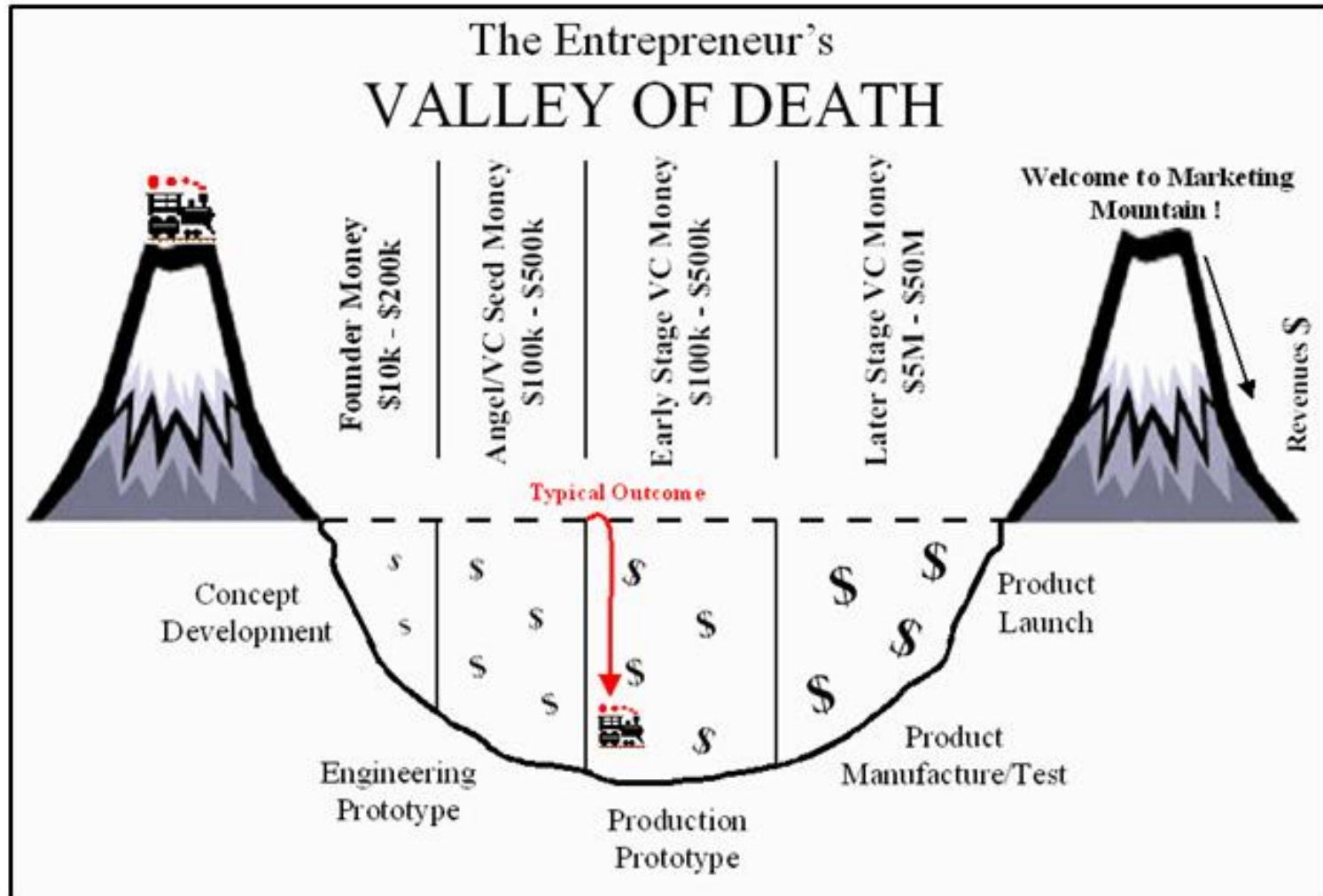
Technology coverage



Agenda

- Past to present: the financing chasm and how we got here
- Looking forward: core attributes of the bankable bioenergy project

There is a giant chasm of financing between early stage venture, and commercial project finance



Claims of biofuels makers seemed so good...in 2008

➤ "Project and the gallon."

➤ "Cellulos"

➤ "\$1.75 pe

➤ "We can

➤ "We will

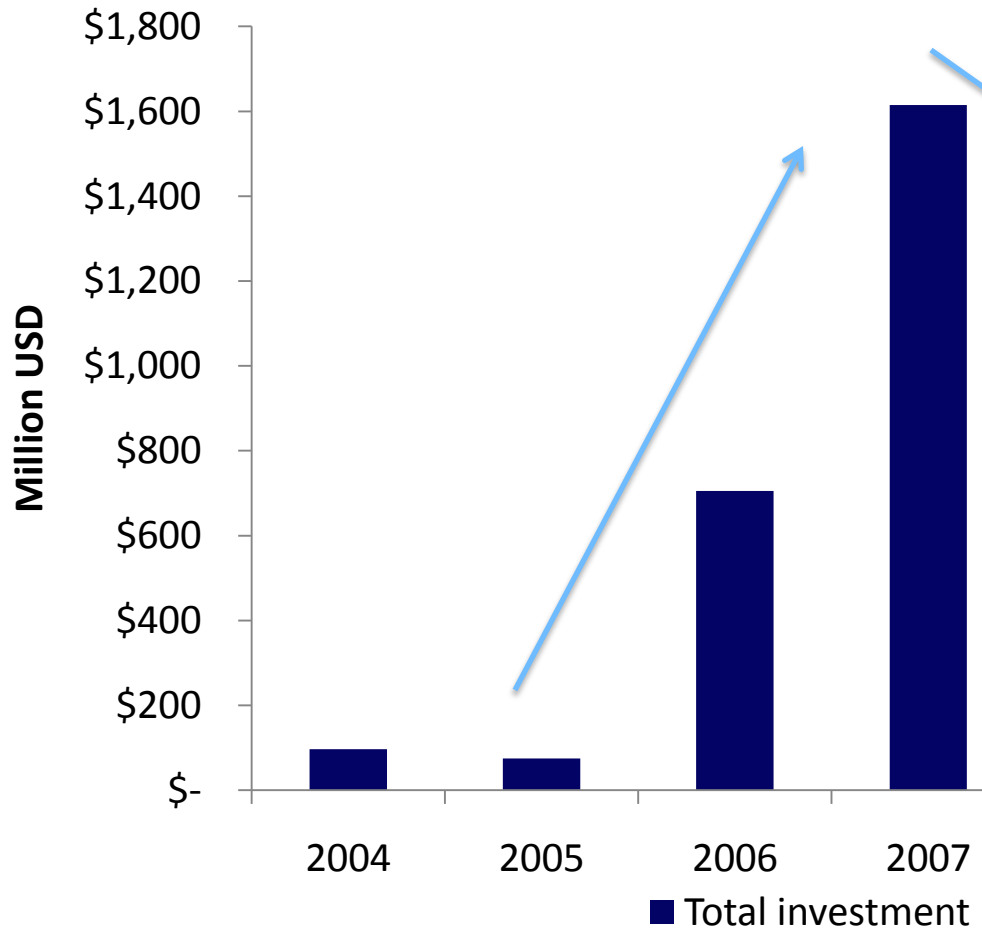
➤ "We can



tic process
2 per

'11"

Total alternative fuel investments: 2004 - 2010



Claims of biofuels makers don't look so good anymore, as technology risk trumped hype

➤ "Project costs to be significantly lower than both the enzymatic and the current corn ethanol production costs that are near \$2 per gallon."



➤ "Cellulosic ethanol without the need for enzymes"



➤ "\$1.75 per gallon gasoline from waste"



➤ "We can get to \$1 per gallon cellulosic ethanol"



➤ "We will be producing ethanol from waste commercially"



➤ "We can produce \$50/barrel oil from CO₂"



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- Looking forward: core attributes of the bankable bioenergy project

Four key factors improve the bankability of new bioenergy projects

- Feedstock security
- Product flexibility
- Strategic partners
- Capital efficiency

To secure feedstock, you most have a flexible process, and feedstock that is reliable and cheap

- For U.S. corn ethanol, feedstock price constitutes roughly **80%** of operating cost
- For cellulosic fuels, feedstock costs make up about **45%** of operating cost
- Because of this, feedstock “security” is king

Flexible



Accessible



Cheap



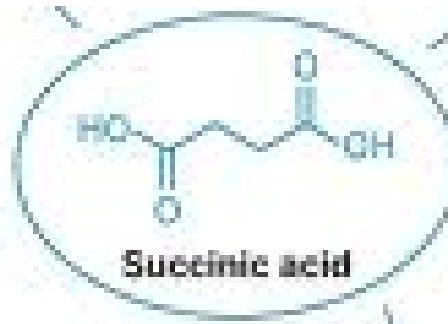
Downstream conversions unlock massive markets for succinic acid



25,000 MT
2013
Spain



20,000 MT
2013
Canada



30,000 tons per year

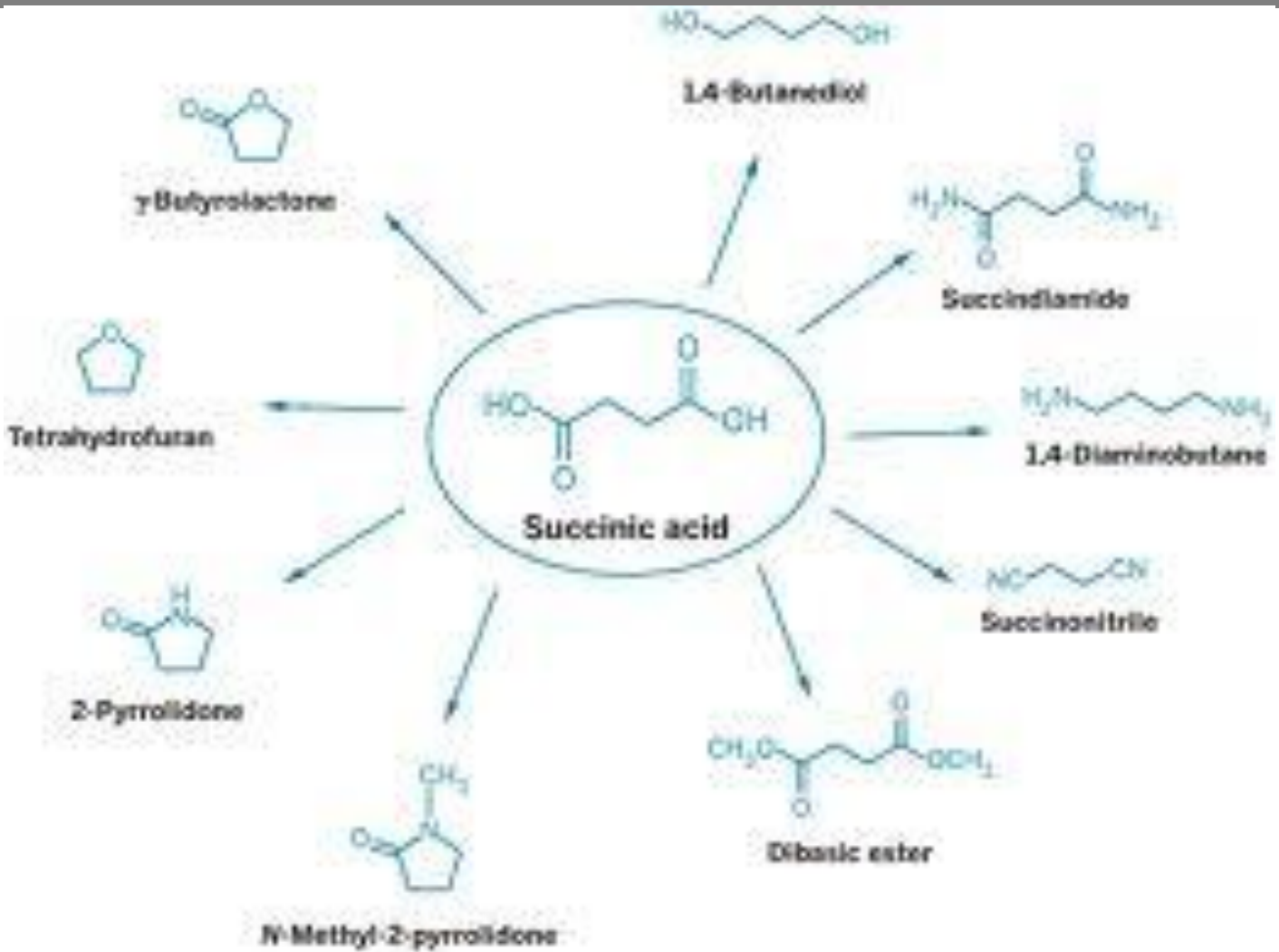


10,000 MT
2012
Italy

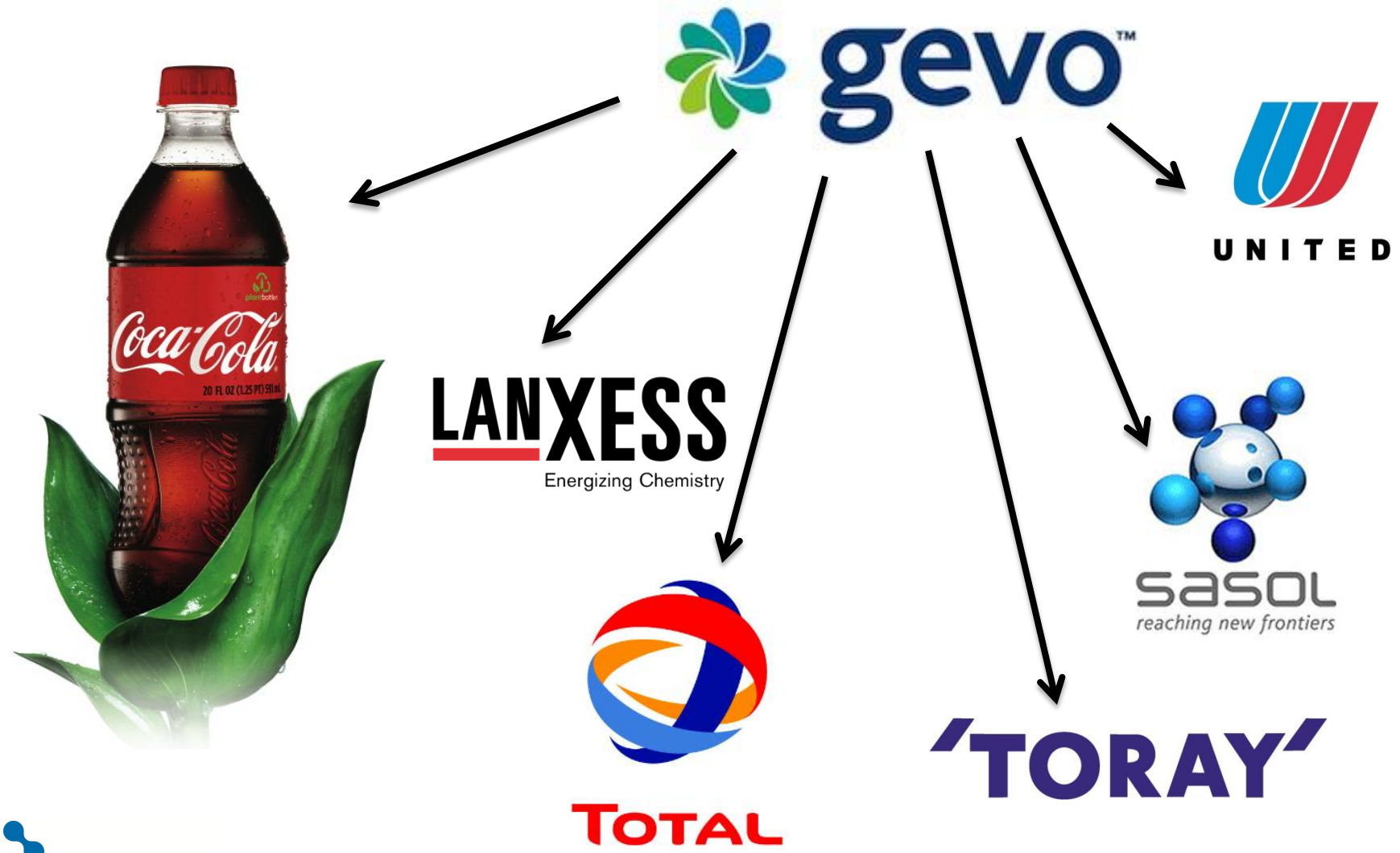


15,000 MT
2012
U.S.

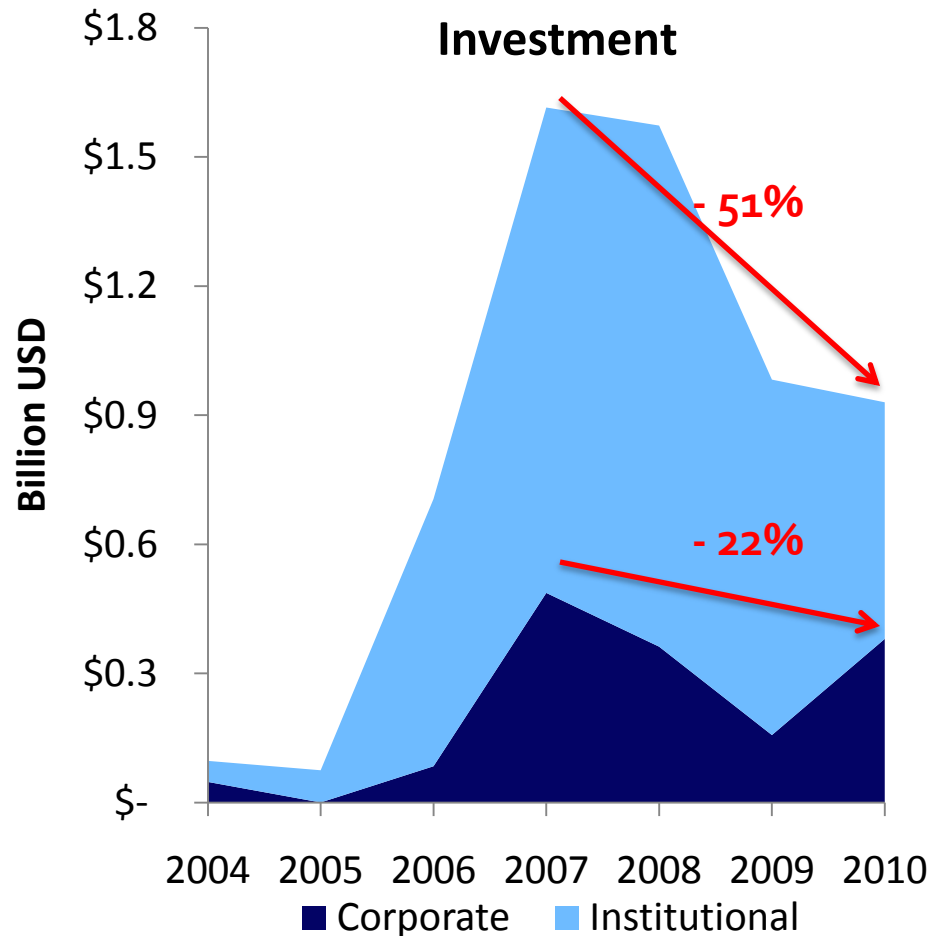
Downstream conversions unlock massive markets for succinic acid



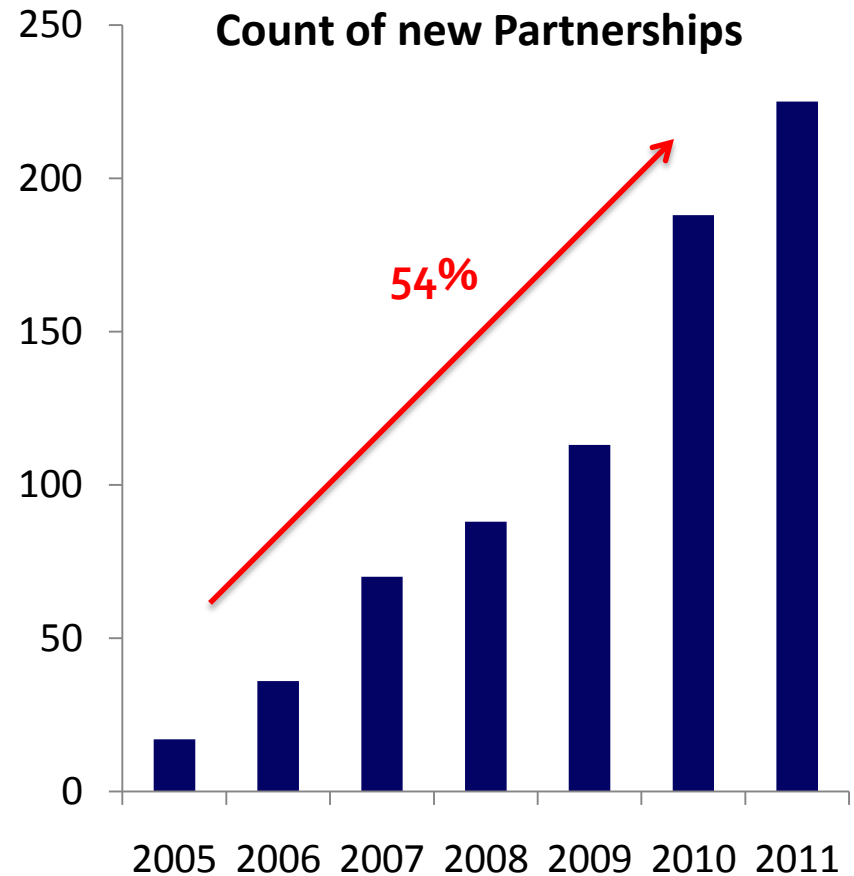
Gevo's downstream partners create products in a range of fuels and chemicals applications



Institutional investment dried up, and corporate activity carried the torch



Source: Lux Research



Source: Lux Research

To lower capital costs, companies are leveraging existing infrastructure

Elevance to convert idle biodiesel plant

By Erin Voegelé | June 10, 2011

Bolingbrook, Ill.-based Elevance Renewable Sciences Inc. has announced the acquisition of an idle biodiesel plant in Natchez, Miss. The former Delta Biofuels facility, which featured an 80 MMgy production capacity, will be converted and

Gevo Announces First Retrofit of Ethanol Demonstration Plant to Biobutanol for the Oil and Chemical Industries

ENGLEWOOD, Colo., Sept. 30 -- Gevo, Inc. today announced the start up of the first biobutanol demonstration plant in the world designed from retrofitting an existing demonstration scale ethanol plant to produce biobutanol. In successfully producing biobutanol at the one million gallon per year pilot plant in St. Joseph, Missouri, Gevo is demonstrating the viability of its technology for retrofitting existing

Butamax™ and Fagen Announce Collaboration to Retrofit Ethanol Plants for Biobutanol Production

fuel. Biobutanol can be blended with hydrocarbons ("green diesel") and bio-based plastics. The

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WILMINGTON, Del., April 19, 2012 /PRNewswire/ -- Butamax™ Advanced Biofuels, LLC, a joint venture between BP and DuPont announced today that it has entered into collaboration with Fagen Inc. for the introduction of commercial biobutanol production using Butamax™ technology. Fagen is the world's most experienced biofuels engineering, procurement and construction contractor having built more ethanol capacity than any other company. They are the largest, most respected green energy design builder in approximately 6 billion gallons of annual production. Fagen's expertise and Butamax's pioneering biobutanol technology provides strong

Eni's Venice refinery to be 'biorefinery'

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HOUSTON, Sept. 24
09/24/2012
By OJG editors

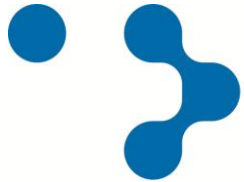
Italy's Eni SPA will turn its 80,000-b/d Venice refinery at Porto Marghera, Italy, into a "biorefinery" based on proprietary technology for the production of biodiesel.

The company will begin the conversion in the second quarter of 2013 and start biofuel production at the beginning of 2014. It estimates the investment at €100 million.

Activities at what Eni calls the Green Refinery will be associated with construction of a logistics center.

Summary

- Though hype still plagues the industry, the best companies focus on core attributes of:
 - Feedstock security
 - Product flexibility
 - Strategic partners
 - Capital efficiency
- **There will be more failures**, as technology risks remain, though investors can protect themselves by focusing on the above, among other key attributes



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Thank you

Andrew Soare

Analyst

+1 917-484-4877

Andrew.soare@luxresearchinc.com