BiofuelsDigest

The world's most widely read biofuels daily

The 50 Hottest Companies in Bioenergy

2010-2011

Selectors Data Book

Including company profiles, industry data and recommendations

An Ascension Book
Published by Ascension Publishing, Inc.
801 Brickell Avenue, Suite 900 Miami, FL 33131
First edition: November 2010

Library of Congress Cataloguing-in-Publication Data
Lane, James M.

50 Hottest Companies in Bioenergy Selectors Data Book
Guidebook for voters in Biofuels Digest's annual company ranking.

50 Hottest Companies in Bioenergy 2010-11 Data Book/James M. Lane.—Ist ed. p. cm. 1. United States—Civilization—1970- 2. United States—Politics and government—2010-2020 I. Title

The 2010-11 50 Hottest Companies in Bioenergy

TABLE OF CONTENTS

WELCOME!

Dear Selector,

First of all, thank you for being a selector for this year's 50 Hottest Companies in Bioenergy. In this effort, you are joining more than 200 scientists, industry leaders, and journalists in a dozen countries, plus the readers of *Biofuels Digest.*

Holding this 374-page behemoth, you may be wondering what you got yourself into!

The information contained in this volume is <u>not required reading</u>. Rather, these company profiles, recommendations, and other materials, are here to assist you. You can use them, or not, as you see fit.

The companies themselves supplied a lot of the material in this book — I made an effort to edit out the "promotional material" and strike anything outrageous. If I missed something you think looks goofy, just skip by it. Data is

Hottest does not mean "best", "biggest" or "most significant" – it means, in your judgment, the companies that best combine the qualities of visibility and credibility, and have the most reasonable potential to reach oil parity pricing and scale.

I hope you find the process enjoyable and educational throughout this month as you deliberate, and this Data Book will be of value to you throughout the year ahead.

With regards,

Jim Lane
Editor & Publisher
Biofuels Digest

November 2010
Key Biscayne, FL

INSTRUX

1. With this PDF, you will have received a Hot 50 ballot in .doc format.

2. Please return your ballot by email to jlane@biofuelsdigest.com, no later than 5pm EST, November 30, 2010.

3. You do not have to choose a complete Hot 50 – just as many as you wish.

4. You may select from any companies actively formed and in the bioenergy sector as of November 1, 2010 – whether or not that company appears somewhere in this selector book or not.

5. Please make your selections in rank order – the Hotest Company at #1, and thence down to #50 or wherever you decide to stop. Your #1 choice will receive 50 points, #2 will receive 49…and so on until 1 point is given to your #50 choice.

7. <u>You are allowed</u> to vote for your own company, if you work for one that is eligible — or for a company you have evaluated, consulted for, or invested in.

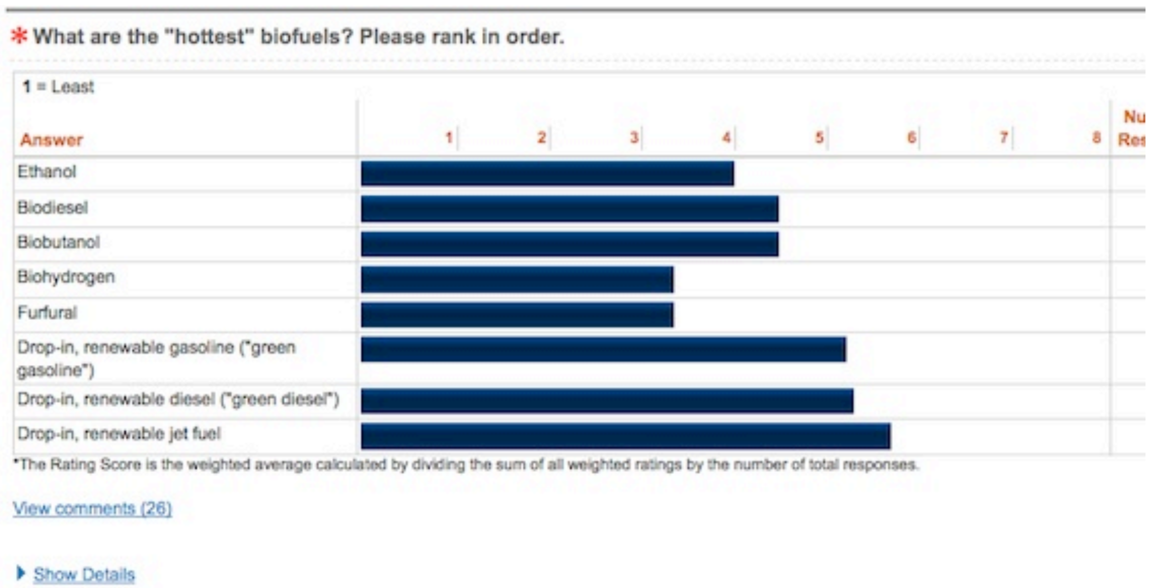
8. Please do not reveal your choices until the Hot 50 is officially announced on December 7, 2010 at 9am EST. I will provide you a copy of the Hot 50 list on December 6, 2010 2009 — but that information is under struct embargo and not for release until 9am EST on December 7th.

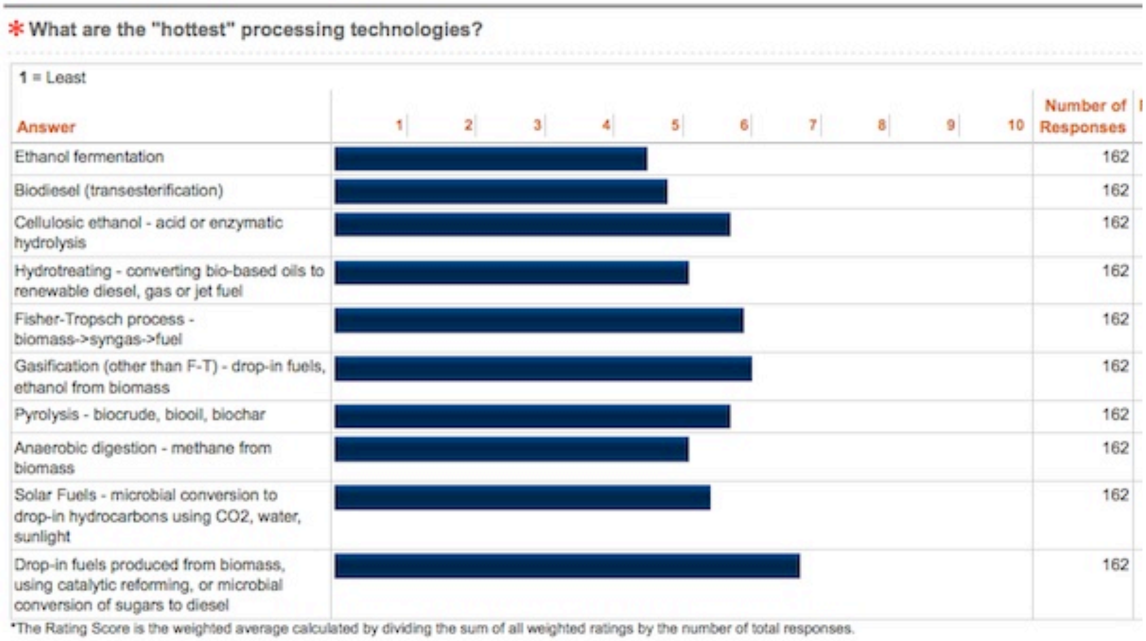
9. Please note that if a company is missing from the selector book, that simply means that their staff did not submit a profile in time.

Thank you for your participation!

HOT FUELS, FEEDSTOCKS AND TECHNOLOGIES

The following data is from an October 2010 Biofuels Digest reader survey.





* What are the "hottest" processing technologies?
1 = Least
Answer
1 2 3 4 5 6 7 8 9 10
Number of Responses
Ethanol fermentation
162
Biodiesel (transesterification)
162
Cellulosic ethanol - acid or enzymatic hydrolysis
162
Hydrotreating - converting bio-based oils to renewable diesel, gas or jet fuel
162
Fisher-Tropsch process - biomass->syngas->fuel
162
Gasification (other than F-T) - drop-in fuels, ethanol from biomass
162
Pyrolysis - biocrude, biooil, biochar
162
Anaerobic digestion - methane from biomass
162
Solar Fuels - microbial conversion to drop-in hydrocarbons using CO2, water, sunlight
162
Drop-in fuels produced from biomass, using catalytic reforming, or microbial conversion of sugars to diesel
162
*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.

THE 2009-10 50 HOTTEST COMPANIES IN BIOENERGY

1. Solazyme
2. POET
3. Amyris Biotechnologies
4. BP Biofuels
5. Sapphire Energy
6. Coskata
7. DuPont Danisco
8. LS9
9. Verenium
10. Mascoma

11. Novozymes
12. UOP Honeywell
13. Gevo
14. Range Fuels
15. Abengoa Bioenergy
16. PetroAlgae
17. Synthetic Genomics
18. Petrobras
19. Bluefire Renewables
20. ZeaChem

21. Virent Energy Systems
22. Qteros
23. Iogen
24. Algenol
25. Enerkem
26. Genencor
27. Shell
28. Ceres
29. ExxonMobil
30. Cobalt Technologies

31. Aurora Algae
32. Joule Biotechnologies
33. Syngenta
34. KL Energy
35. Codexis
36. IneosBio
37. Renewable Energy Group
38. Rentech
39. Praj Industries
40. Neste Oil

41. LanzaTech
42. OriginOil
43. Choren
44. Solix
45. Chemrec
46. Dynamotive
47. Terrabon
48. Fulcrum Bioenergy
49. SG Biofuels
50. Inbicon

THE 2008-09 50 HOTTEST COMPANIES IN BIOENERGY

1. Coskata
2. Sapphire Energy
3. Virent Energy Systems
4. POET
5. Range Fuels
6. Solazyme
7. Amyris Biotechnologies
8. Mascoma
9. DuPont Danisco
10. UOP

11. ZeaChem
12. Aquaflow Bionomic
13. Bluefire Ethanol
14. Novozymes
15. Qteros
16. Petrobras
17. Cobalt Biofuels
18. Iogen
19. Synthetic Genomics
20. Abengoa Energy

21. KL Energy
22. Ineos
23. GreenFuel
24. Vital Renewable Energy
25. LS9
26. Raven Biofuels
27. Gevo
28. St.1 Biofuels Oy
29. Primafuel
30. Taurus Energy

31. Ceres
32. Syngenta
33. Aurora Biofuels
34. Bionavitas
35. Algenol
36. Verenium
37. Simply Green
38. Carbon Green
39. SEKAB
40. Osage Bioenergy

41. Dynamotive
42. Sustainable Power
43. ETH Bioenergia
44. Choren
45. OriginOil
46. Propel Fuels
47. GEM Biofuels
48. Lake Erie Biofuels
49. Cavitation Technologies
50. Lotus/Jaguar – Omnivore

THE 2010 TRANSFORMATIVE TECHNOLOGY 30

Algenol (*MicroAlgae, cyanobacteria, lemna, and plankton platforms*)

Amyris Biotechnologies (*Microbial fuels*)

BioEnergy International (*Renewable chemicals*)

Butamax (*Biobutanol technologies*)

Ceres (*Advanced feedstock technologies*)

ClearFuels-Rentech (*Fischer-Tropsch technologies*)

Cobalt Technologies (*Biobutanol technologies*)

Coskata (*Cellulosic ethanol*)

DuPont – BioArchitecture Lab (*Seaweed – Macroalgae technologies*)

Dupont Danisco Cellulosic Ethanol (*Cellulosic ethanol*)

Energy Allied International, The Seawater Foundation and Global Seawater (*Salt-tolerant feedstocks*)

Ford Motor Company – Bobcat project (*Engine technologies*)

Genencor (*Enzyme technologies and platforms*)

Gevo (*Biobutanol technologies*)

Green Biologics (*Biobutanol technologies*)

Joule Unlimited (*Microbial fuels*)

KL Energy (*Cellulosic ethanol*)

LS9 (*Microbial fuels*)

Mascoma (*Cellulosic ethanol/Consolidated Bioprocessing*)

Masdar Institute of Science and Technology, Boeing, Etihad Airways and UOP

Honeywell (*Salt-tolerant feedstocks*)

Mitchell Technology (Catalyzed ionoic impact)

Novozymes (*Enzyme technologies and platforms*)

OriginOil (*MicroAlgae, cyanobacteria, lemna, and plankton platforms*)

PetroAlgae (*MicroAlgae, cyanobacteria, lemna, and plankton platforms*)

POET (*Cellulosic ethanol*)

Qteros (*Cellulosic ethanol/Consolidated Bioprocessing*)

Sapphire Energy (*MicroAlgae, cyanobacteria, lemna, and plankton platforms*)

SBI Bioenergy (*Biodiesel systems*)

SES – Seaweed Energy Solutions (*Seaweed – Macroalgae technologies*)

Solazyme (*MicroAlgae, cyanobacteria, lemna, and plankton platforms*)

Verenium (*Cellulosic ethanol*)

Overall, the 30 selected organizations represented 14 of the 18 total categories in the poll. Among categories that did not produce a winner, the Massachusetts Institute of Technology's butanol-based project led in the Electrofuels category, Iowa State led in the Pyrolysis category, the Solana/British Airways project led in the waste-to-energy category, and UOP led in the Chemical reforming and hydroprocessing category.

Close competition between numerous competing technologies within a category in many cases prevented outstanding companies from reaching the Top 30 – notably, fierce competition in the waste-to-energy, pyrolysis and enzyme technology categories. Support for organizations developing microalgae-based technologies was particularly strong with 17.83 percent of readers selecting the category as a whole.

One technology, the FORD Bobcat project which developed an ethanol-injection technology capable of increasing fuel economy through use of ethanol (compared to a drop of up to 25 percent, using ethanol in standard engines), was discontinued by its developers.

Overall, six of the recipients represented consortia or joint ventures.

21 of the 30 organizations recognized in the Transformative Technologies poll also were recognized in the "50 Hottest Companies in Bioenergy" for 2009-10.

The leading categories, as recognized by the readers, were:

MicroAlgae, cyanobacteria, lemna, and plankton platforms – 17.83%

Waste to energy and symbiotic systems – 9.46%

Seaweed – Macroalgae technologies – 8.63%

Biodiesel systems – 8.59%

Cellulosic ethanol – 7.83%

Biobutanol technologies – 6.47%

Microbial fuels – 5.64%

Renewable chemicals – 4.81%

Enzyme technologies and platforms – 4.09%

Cellulosic ethanol/Consolidated Bioprocessing – 3.67%

Pyrolysis – 3.60%

Advanced feedstock technologies - 3.48%

Salt-tolerant feedstocks – 3.41%

Small scale systems and microfuelers – 3.03%

Engine technologies - 2.99%

Chemical re-forming and hydroprocessing technologies – 2.20%

Electrofuels – 2.16%

Fischer-Tropsch technologies – 2.12%

Organizations that missed out on the top 30, but ranked in the overall Top 50

(Please follow the link below for more data on each organization's technologies)

Algaeventure Systems (*MicroAlgae, cyanobacteria, lemna, and plankton platforms*)

Aurora Biofuels (*MicroAlgae, cyanobacteria, lemna, and plankton platforms*)

Bluefire Ethanol (*Cellulosic ethanol*)

British Airways/Solana (*Waste to energy and symbiotic systems*)

Codexis (*Enzyme technologies and platforms*)

eMicrofueler (*Small scale systems and microfuelers*)

Enerkem (*Waste to energy and symbiotic systems*)

Iogen (*Cellulosic ethanol*)

Lawrence Berkeley National Laboratory (*Electrofuels*)

Louisiana Tech enzyme project (*Enzyme technologies and platforms*)

Massachusetts Institute of Technology (*Electrofuels – biodiesel and butanol projects*)

Mcgyan process (*Biodiesel systems*)

National Alliance for Advanced Biofuels and Bioproducts (*MicroAlgae, cyanobacteria, lemna, and plankton platforms*)

SynGest (*Renewable chemicals*)

Synthetic Genomics (*Advanced feedstock technologies*)

University of Cincinnati (*Microbial fuels*)

UOP (*Chemical re-forming and hydroprocessing technologies*)

Virent Energy Systems (*Chemical re-forming and hydroprocessing technologies*)

W2Energy (*Waste to energy and symbiotic systems*)

ZeaChem (*Cellulosic ethanol*)

THE TOP 100 PEOPLE IN BIOENERGY

as voted by the readers and editors of Biofuels DIgest

1. Tom Vilsack, US Secretary of Agriculture
2. Jeff Broin, CEO, POET
3. Bob Dinneen, President, Renewable Fuels Association
4. Miguel Soldateli Rossetto, CEO, Petrobras Biocombustiviles
5. Jonathan Wolfson, CEO, Solazyme / Harrison Dillon, PhD, CTO
6. Steven Chu, US Secretary of Energy
7. Marcos Lutz, CEO, Cosan
8. Alan Shaw, PhD, CEO, Codexis
9. Marcos Jank, President, UNICA
10. Vincent Chornet, CEO, Enerkem / Esteban Chornet, CTO
11. Steen Riisgaard, CEO / Steen Skjold-Jørgensen, VP for R&D Biofuels, Novozymes
12. Philip New, CEO, BP Biofuels / Sue Ellerbusch, President, BP Biofuels America
13. Brent Erickson, VP Industrial Biotechnology, BIO
14. Jason Pyle, CEO, Sapphire Energy, Cynthia (C.J.) Warner, President
15. Mike McAdams, President, Advanced Biofuels Association
16. Vinod Khosla, Managing Partner, Khosla Ventures
17. Jay Keasling, PhD, Professor, UC Berkeley
18. Patricia Woertz, CEO, Archer Daniels Midland
19. John Melo, CEO, Amyris / CTO Neil Renninger
20. Paul Woods, CEO, Algenol Biofuels
21. Pat Gruber, PhD, CEO, Gevo / Jack Huttner, EVP Corporate Development and Public Affairs
22. Bruce Dale, PhD, Michigan State University
23. Jim Sayre, Senior MD, Cargill Ventures / Ian Purtle, Director of Sustainable Energy
24. Rich LaDuca, Genencor / Bjarne Adamsen, Danisco
25. Joe Skurla, CEO, DuPont Danisco Cellulosic Ethanol
26. Rob Vierhout, Secretary General, EBIO
27. Valerie Reed, DOE Biomass Program / Paul Bryan
28. Lee Edwards, CEO, Virent / Randy Cortright, PhD, CTO, Virent Energy Systems

29. Bill Sims, CEO, Joule Unlimited

30. Collin Peterson, Stephanie Herseth-Sandlin, Earl Pomeroy, US House of Representatives

31. Mary Rosenthal, Exec Director, Algal Biomass Organization

32. Bill Haywood, CEO, LS9

33. Chuck Grassley, John Thune, Jeff Bingaman, Tim Johnson, US Senators

34. Lisa Jackson, US EPA Administrator

35. Ray Mabus, US Secretary of the Navy

36. Barry Cohen, Executive Director, National Algae Association

37. Chris Somerville, PhD, Professor, UC Berkeley Director, EBI

38. Jennifer Holmgren, CEO, Lanzatech / Sean Simpson CTO, founder

39. Joe Jobe, CEO, National Biodiesel Board

40. Rich Altman, Exec Director, CAAFI

41. Wesley Clark, Co-chairman, Growth Energy / Tom Buis, CEO

42. Jim Stewart, Chairman, Bioenergy Producers Association

43. Hugh Grant, CEO, Monsanto

44. Lee Lynd, PhD, Professor of Engineering, Dartmouth College

45. Alwin Kopse, Exec. Director, Roundtable on Sustainable Biofuels

46. Dan Adler, California Clean Energy Fund

47. Arnold Klann, CEO, Bluefire Ethanol

48. Nancy Young, VP, Environmental Affairs, Air Transport Association / John Heimlich Chief Economist

49. Riggs Eckelberry, CEO, OriginOil / Brian Goodall, PhD, CTO

50. Jose Olivares, PhD, Director, National Alliance For Advanced Biofuels and Bio-Products

51. Craig Venter, PhD, CEO, Synthetic Genomics / Emil Jacobs, VP R&D, ExxonMobil

52. Jim Dumesic, PhD, University of Wisconsin-Madison

53. Jim Matheson, General Partner, Flagship Ventures / David Berry, PhD, Partner

54. Richard Hamilton, CEO, Ceres

55. John Doerr, Managing Partner, Kleiner Perkins

56. Steve Burrill, Managing Partner, Burrill & Co / John Hamer, PhD, Managzing Director / Roger Wyse, Managing Director / Greg Young, Managing Director

57. Bill Roe, CEO, Coskata / Wes Bolsen, CMO Coskata

58. Doug Cameron, CEO, Alberti Advisors
59. Tom Foust, PhD, NREL; Director, National Advanced Biofuels Consortium
60. Al Darzins, PhD, NREL / Philip Pienkos, PhD
61. Robert Brown, PhD, Professor, Iowa State University
62. Kristina Burow, Partner, ARCH Venture Partners / Bob Nelsen
63. Ganesh Kishore, PhD, CEO, Malaysian Life Sciences Fund
64. Stephen Mayfield, PhD, Professor, UCSD
65. John McCarthy, CEO, Qteros / Kevin Gray, CTO
66. Javier Salgado, CEO, Abengoa Bioenergy
67. Fred Cannon, PhD, CEO, KiOR
68. Bill Glover, MD, Environmental Strategy Boeing
69. Tom Baruch, CEO, CMEA
70. Heather Brodie, CEO, Biofuels Association of Australia
71. David Aldous, CEO, Range Fuels
72. Jim Imbler, CEO, ZeaChem
73. Bryan Willson, CTO Solix / Doug Henson CEO
74. Bill Brady, CEO, Mascoma
75. Bill Lese, MD, Braemar Energy Ventures
76. Rick Wilson, CEO, Cobalt Technologies
77. Matti Lievonen, CEO, Neste Oil
78. Pramod Chaudhari, Executive Chairman, Praj Industries
79. Jack Oswald, CEO, SynGest
80. Bill Hagy, Director, USDA Director of Alternate Energy Policy / Dallas Tonsager, USDA Under Secretary for Rural Development
81. Lonnie Ingram, PhD, Professor, University of Florida
82. Sean O'Hanlon, Executive Director, American Biofuels Council
83. Kirk Haney, CEO, SG Biofuels
84. Joanne Ivancic, Exec Dir, Advanced Biofuels USA
85. John Scott, CEO, PetroAlgae
86. Todd Taylor, Partner, Fredrickson & Byron
87. Rafaello Garofalo, Secretary General, European Biodiesel Board
88. Bliss Baker, MD, Global Renewable Fuels Alliance
89. Tim Cesarak, MD, Organic Growth Group, Waste Management

90. Philip Wolfe, CEO, UK Renewable Energy Association

91. Phil Bredesen, Governor of Tennessee / Kelly Tiller, CEO Genera Energy, Tim Rials, University of Tennessee

92. John Benemann, PhD, CEO, Benemann Associates

93. Brian Bilbray / Harry Teague / Jay Inslee / Dave Reichart / Mary Bono Mack, US House of Representatives

94. Bill Holmberg, ACORE Biomass Coordinating Council

95. Charles Wyman, Professor, UC Riverside

96. Gary Luce, CEO, Terrabon

97. David Tilman, PhD, Professor, University of Minnesota

98. Michael Wang, Argonne National Laboratory

99. Hunt Ramsbottom, CEO, Rentech

100. Brian Foody, CEO, Iogen

1. Tom Vilsack, US Secretary of Agriculture

A runaway winner in the voting, Vilsack has been driving hard to implement a strong biofuels policy on behalf of the Obama Administration, and as chair of the Interagency Working Group (comprising the USDA, EPA, and DOE) has clearly been identified by the Digest readership as the key player in establishing policy stability, and pioneering the financing mechanisms to drive bioenergy forward in the 2010s.

2. Jeff Broin, CEO, POET

A number of POET execs polled strongly in the voting – but head and shoulders above the rest has been CEO Jeff Broin, who took charge of a small family ethanol enterprise in the 1980s and transformed it into the Starbucks of corn ethanol – everywhere, strongly branded, home to its own unique culture, and a pioneer both in achieving first generation scale and next-generation technical leadership as the company pioneers its Project LIBERTY cellulosic ethanol plant in Emmetsburg, IA.

3. Bob Dinneen, President, Renewable Fuels Association

A number of association executives polled strongly with readers, but Dinneen, who rules over the large and influential RFA, is still recognized as the face of first-generation biofuels on Capitol Hill among the readership.

4. Miguel Soldateli Rossetto, CEO, Petrobras Biocombustiviles

Among the many Brazilians gracing this years list, the fast growth and determination of the state-owned Petrobras propelled biofuels division CEO Miguel Rossetto into the global top five. Incredibly aggressive growth targets and the backing of the Brazilian government proved to Digest readers that Petrobras management now means business when it comes to controlling (some grumblers say 'strangling') the Brazilian markets for ethanol.

5. Jonathan Wolfson, CEO, Solazyme / Harrison Dillon, PhD, CTO, Solazyme

The gold dust twins of advanced biofuels, Jonathan Wolfson and Harrison Dillon at Solazyme have been working nearly a decade on their Solazyme brainchild and ran the gamut on ways to grow algae before settling on their "grow in the dark" strategy, but in the past couple of years the company has been achieving serious traction in racking up investor dollars and (as algal fuels go) big orders from the US Navy among others. Many insiders in the industry have tapped Solazyme as the next big IPO candidate, and while it may mean a big payday for these two co-founders, Digest readers take the view that its a payday well deserved.

6. Steven Chu, US Secretary of Energy

A surprisingly low finish for the godfather of US biofuels funding may have suffered in the poll from the unabashed love that has been lavished on electric cars during his time at DOE, but Chu remains the most technically astute Secretary of Energy on the subject of biofuels in the troubled history of that US Department, by about a million miles. His portfolio strategy, emphasis on forming scientific collaborations, and sponsorship of ARPA-E will prove a formidable legacy, and Digest readers appear ready to not begrudge him a shiny Tesla or two when he chooses to leave office.

7. Marcos Lutz, CEO, Cosan

Nothing like a $12 billion biofuels JV / merger to propel an executive into the Top 10 faces in bioenergy. Though Cosan has yet to articulate its advanced biofuels vision, it has proven its Branson-like ability to grow and attract attention like no other bioenergy venture since, well, the forays of Sir Richard Branson. No one is quite sure where the Shell-COsan venture will head, but it will have the balance sheet and downstream market to head just about anywhere it wants, subject only to the titanic capabilities and desires of Petrobras.

8. Alan Shaw, PhD, CEO, Codexis

The first biofuels IPO in several years, and the first advanced biofuels IPO ever? Welcome to the Top 10, Alan Shaw. Though the stock nose-dived after its NASDAQ debut, those who bought in at its low-point under $7 per share will have realized a tidy 73 percent return on their investment over the past few months, making quite a few happy shareholders in and around Redwood City.

9. Marcos Jank, President, UNICA

Filling out a trio of Brazilians in the global Top 10 is Marcos Jank, the head of the Brazilian sugarcane association UNICA, whose organization has been building up its presence around the world as it presses for open markets and export opportunities for Brazil's in-vogue streams of cheap sugar.

10. Vincent Chornet, CEO, Enerkem / Esteban Chornet, CTO, Enerkem

Canada's top representatives in the Top 100 poll are the father and son combination of Vincent and Esteban Chornet, who have propelled the once-unknown Enerkem to a leading position among advanced biofuels developers. Signature projects in Alberta and Mississippi are also likely to take the company to new heights in the Hottest 50 Companies in Bioenergy in polling later this year.

11. Steen Riisgaard, CEO / Steen Skjold-Jørgensen, VP for R&D Biofuels, Novozymes

Novozymes, like Danisco/Genencor, DSM and Dyadic, have been aggressively launching product this year, driving down enzyme costs faster than wide-screen TV prices have been plummeting of late. A bunch of Novozymes execs landed votes in this competition, but readers focused their attention on a pair of Steens, CEO Steen Riisgaard and R&D VP Steen Skjold-Jørgensen – apt for a company driven by a combination of strategic investments and fast-moving technologies.

12. Philip New, CEO, BP Biofuels / Sue Ellerbusch, President, BP Biofuels

Though BP could not be said to have had a banner year in its storied history, BP Biofuels has remained a stellar "beyond petroleum" unit of the company that, in the midst of difficulties in the fossil fuels side, acquired 50 percent of Vercipia from Verenium and ploughed forward aggressively in developing its Butamax biobutanol venture with Dupont. Not to mention its progress on its UK ethanol project with British Sugar in Hull. The driver at BP on biofuels – Phil New, who picked up a surprising Top 20 ranking in this year's poll.

13. Brent Erickson, VP Industrial Biotechnology, BIO

Way, way out in front on renewable chemicals and other bio-based products, not to mention a strong sense of the value equation across the gamut of advanced biofuels, BIO's Brent Erickson has led a team that has made "industrial biotech" a phrase worth knowing on Capitol Hill, as well as being an incisive advocate on all things biofuel.

14. Jason Pyle, CEO, Sapphire Energy, Cynthia (C.J.) Warner, President

The polling for Sapphire president CJ Warner and CEO Jason Pyle of Sapphire was so evenly and closely paired, that we've jointly awarded them the #14 slot in this years poll. Warner's appearance in a major layout in Fast Company this summer when they surveyed the "Beyond Petroleum" generation of ex-BPers, and a well-received addres at this years Advanced Biofuels Leadership Conference, pushed her to the #1 slot among female bioenergy execs (a rising cadre, for sure), but in general readers have strongly supported Sapphire for holding fast to its "we're making fuels, darn it" strategy, and the steady progress it keeps making towards its 2014 demonstration plant debut and a proposed 100 Mgy plant by 2018.

15. Mike McAdams, President, Advanced Biofuels Association

Master of the biofuels elevator pitch, Mike McAdams has taken the Advanced Biofuels Association from formation to a recognized player on a small budget and a relentless message. A "most-know" conduit for Capitol Hill dialogue on advanced bioenergy, Mike's legion of fans has grown by leaps and bounds over the past couple of years, as more companies have signed on with AFBA and its mastery of tax-writing through to image shaping at the leading edge of biofuels.

16. Vinod Khosla, Managing Partner, Khosla Ventures

A popular figure with readers, Khosla has toned down his biofuels profile in recent years, but still rates high for his teams' wide portfolio of biofuels bets, his strong voice on policy, and for unparalleled financial commitment to transformation of energy.

17. Jay Keasling, PhD, Professor, UC Berkeley

If Jay Keasling did nothing but supervise the collaboration between Lawrence Livermore, U of Illinois and Berkeley known as the Energy Biosciences Institute and run a storied lab, he probably would have taken a high slot on our list. But his signature (commercial) discovery, the underlying technology behind Amyris, helped to power a very successful IPO this year, and may well transform, the Brazilian biofuels landscape with its sugar-to-diesel microbiology.

18. Patricia Woertz, CEO, Archer Daniels Midland

Among the ABCDs in global ag trading (Archer Daniels Midland, Bunge, Cargill and Dreyfus), none have taken a strong a role in developing both first generation and second generation biofuels technology as ADM. Though when calling corporate HQ, you'll be told that "we don't like to talk about ethanol," the company is neck and neck with POET for leader in global corn ethanol capacity, and has skin in the game on biodiesel as well as other advanced biofuels as well. Calling the shots? Former Chevron exec Patricia Woertz, who ascended to the ADM throne and is managing its advancement with great aplomb, according to our poll.

19. John Melo, CEO, Amyris / CTO Neil Renninger

A big number of folk associated with the successful Amyris IPO figure in the Top 100 poll, but John Melo and Neal Renninger have been raking in the votes – not surprising for a company neatly balanced between a bold Brazilian-focused, capital-light strategy and a hot technology moving towards oil parity and scale. Amyris's exces jhave been out of the limelight in recent months, owing to the IPO, else we might have expected them to poll even higher in the Top 20.

20. Paul Woods, CEO, Algenol Biofuels

Rounding out our Top 20 is Paul Woods, who has shepherded Algenol Biofuels from a little-known start-up to near household-recognition status within biofuels, landing a signature partnership with Dow and a massive grant from DOE for its unique algae-to-ethanol process.

21. Pat Gruber, PhD, CEO, Gevo / Jack Huttner, EVP Corporate Development and Public Affairs, Gevo

Gevo scored surprisingly well in this poll, considering all the major execs are muzzled in the quite period relating to the company's IPO registration, filed earlier in the summer. The company's biobutanol technology has been getting heaps of attention for its high blending rates, relatively low cost of conversion from first-gen ethanol to next-gen fuel, and the company's acquisition of capacity in Minnesota this year also put the company into a revenue-generating mode. Pat Gruber received the Carver Award a few years back for Lifetime Achievement from BIO< and corporate affairs head Jack Huttner has also been active on BIO's key committees and industrial biotech board – both polled so strongly with readers that we've paired them at #21.

22. Bruce Dale, PhD, Michigan State University

Second among all academics in this year's poll is Dr. Bruce Dale at Michigan State, who in addition to being a noted pioneer in cellulosic ethanol has been out in front in terms of opposing some of the excesses of indirect land use change theory, measurement of which has bedeviled efforts to stabilize the demand for various biofuels feedstocks and fuels.

23. Jim Sayre, Senior MD, Cargill Ventures / Ian Purtle, Director of Sustainable Energy, Cargill

The "quiet company" in biofuels produced voting surges for two candidates, Jim Sayre on the investment side and Ian Purtle on the Sustainable Energy development side. Sayre also received a slew of write-in votes from US based voters.

24. Rich LaDuca, Genencor / Bjarne Adamsen, Danisco

Voting was divided this year for Genencor between Danisco, Genencor and its investment in Dupont Danisco Cellulosic Energy, but a big series of product introductions in the spring ranging from enzymes to its signature investment in bioisoprene produced a slew of votes for both Rich LaDuca, based in the Bay Area, and Bjarne Andersen on the European side.

25. Joe Skurla, CEO, DuPont Danisco Cellulosic Ethanol

One of the biggest grass roots campaigns produced votes for just about every executive associated with DDCE, Genera Energy and the University of Tennessee's biofuels programs. In this anti-incumbent political year, even Tennessee Governor Phil Bredesen picked up enough votes to make it into the Top 100. But heads and shoulders above the rest were DDCE and its CEO, Joe Skurla, who have been working on corn cob and switchgrass-based biofuels and are readying their commercialization package.

26. Rob Vierhout, Secretary General, eBIO

At the top among European association execs was Rob Vierhout, Secretary General, EBIO, who supervises the organization of the EU effort on ethanol. The EU has been an up-and-down market for ethanol in terms of the popularity of proposed 2020 mandates, but producers lioke Abengoa have been expanding their tentacles for home years now around the globe, and the global readership rewarded that effort with a high 20s ranking for Rob Vierhout.

27. Valerie Reed, Acting head, DOE Biomass Program / Paul Bryan, DOE Biomass Program manager

With Paul Bryan just now making the switch from Chevron to manager of the DOE's critical Biomass Program, readers were split between interim head Valerie Reed and Bryan, so we have paired them at #27. Reed for a job well done in keeping the Biomass Program evolving while the search was on for a permanent head, and now Bryan as he takes the reins at a critical juncture for bioenergy.

28. Lee Edwards, CEO, Virent / Randy Cortright, PhD, CTO

Lee Edwards recently ascended to the chairmanship of the Advanced Biofuels Association in addition to helming Virent – but voters recognized not only Edwards with strong votes, but also CTO Randy Cortright, who heads the efforts to bring the sugar-to-diesel technology via bioforming) from lab to commercial scale. We've paired them at #28.

29. Bill Sims, CEO, Joule Unlimited

Joule has come out of stealth mode with a roar over the past 18 months, and CEO Bill SIms, while managing expectations for the early-stage company, has been attracting waves of support for the company's "fuel from thin air" technology that converts sunlight, CO2 and water directly into drop-in renewable fuels as well as ethanol and other bio-based materials. Other groups are working on direct conversion, but Joule is miles ahead in its race, and has set a goal of being competitive with $30 oil. That's got the attention of a global readership, which awarded him a slot at #29.

30. Collin Peterson, Stephanie Herseth-Sandlin, Earl Pomeroy, US Congressman

Three Midwestern House Democrats – two of them running into stiff headwinds in their re-election efforts, in Herseth-Sandlin and Pomeroy – have been among the loyal workhorses for first-generation ethanol in the House. Peterson is not considered seriously at risk this year, but may well lose the gavel at the House Agriculture Committee, where he has been a formidable opponent of the EPA's current view on indirect land use change.

31. Mary Rosenthal, Executive Director, Algal Biomass Organization

The ABO's first full-time director, responsible for a slew of policy and membership issues, received near-unanimous support for the Top 100 from the algaerati, and would have placed higher if international awareness had been equal to US votes. One of the top women in this year's poll, this veteran of Cargill's NatureWorks unit has been helping to marshal a formidable US effort on algal fuels.

32. Bill Haywood, CEO, LS9

LS9 has been trailing Amyris on its timeline towards commercialization, but has been making significant stride sof its own, including one of the neatest demo plant concepts to come along in some time, a 12 Mgy set of fermenters in Florida bought out of bankruptcy for peanuts and upgradable to LS9's profits. The king of capital light, Bill Haywood, has been rumored to be in the running for the next couple of companies to test out the public markets for an IPO-based capital raise. That's probably premature, but indicative of the heat on sugar-to-diesel technologies like Amyris and LS9 have.

33. Chuck Grassley, John Thune, Jeff Bingaman, Tim Johnson, US Senators

If Pomeroy, Peterson and Herseth-Sandlin have been getting it done on first-gen fuels in the House, among the leaders pushing for biofuels on the Senate side are the bi-partisan trio of Grassley, Thune, Bingaman and Johnson. Two Democrats, two Republicans, all committed to a vision of renewable energy. Thune is widely rumored to be mulling a run for the Presidency in 2012.

34. Lisa Jackson, US EPA Administrator

Lisa Jackson polled surprisingly low among Digest readers, who have been thumbs-down on the EPA over foot-dragging on E15 and over what the industry regards as its embrace of "not ready for primate time" emerging science on indirect land use change. Still, others recognized the powerful role that the EPA plays in regulating fuels, and also now in regulating emissions from ethanol plants now that CO2 has been placed ion the the polluting gas lists.

35. Ray Mabus, US Secretary of the Navy

Secretaries of the Navy generally have a low profile, but former Mississippi governor Ray Mabus has been charting a high-profile course for the Navy to establish a fossil-fuel free Green Strike Force by 2016, which will commence testing as soon as 2012. They've become the largest customer for algal fuels, and though they are paying $500 toilet seat prices for the small quantities of military-spec fuel they are buying, they are moving the needle in ways the readership has clearly embraced.

36. Barry Cohen, Executive Director, National Algae Association

Since establishing the NAA several years ago, Barry Cohen has been a consistent advocate for commercial-ready fuels, and moving emphasis from R&D to commercialization, right down to establishing a NAA_sponsored algal testing facility.

37. Chris Somerville, PhD, Professor, UC Berkeley, Director, EBI

Chris Somerville checked in at #37 as one of the highest rated academics in the poll, supervising a huge BP-funded effort on biofuels at the Energy Biosciences Institute, as well as participating in the founding of LS9. A godfather in West Coast research.

38. Jennifer Holmgren, CEO / Sean Simpson CTO, founder Lanzatech

Both Lanzatech founder Sean Simpson and CEO Jennifer Holmgren picked up strong support this year and we've paired them at #38, especially considering the number of write-ins that came in for Jennifer from fans of her work at UOP. This steel-gas ethanol company hasd been figuring heavily in the news this year as one of the first Western advanced biofuels technologies to gain some real traction in China.

39. Joe Jobe, CEO, National Biodiesel Board

Biodiesel has been in the dumnps in the past 18 months, and on the volumes has never been as formidable as corn ethanol, but fitting biodiesel into the category of "advanced biofuels" under the US's Renewable Fuel Standard, as well as supplying biodiesel for Canada's mandates has proved a boon to the industry. Joe Jobe has proven adept in steering the NBB during hard times, and with large mandates looming, will have his hands full balancing the tightrope between overcapacity and shortages.

40. Rich Altman, Exec Director, CAAFI

Rounding out the top 40 is Rich Altman , heading the Civil Aviation Alternative Fuels Initiative, which has been one of the key drivers on aviation biofuels. He was a founding member of the US Transportation Research Board Committee on Aviation effects on the Environment and a member of the PARTNER Center of Excellence Advisory Board.

41. Wesley Clark, Co-chairman, Growth Energy / Tom Buis, President, Growth Energy

We have paired Wes Clark and Tom Buis at #41; both pulled down a lot of votes, with Clark a little ahead owing to his generally higher profile. Both have been persistent, consistent, relentless and yet entertaining advocated for first-generation ethanol, and certainly make news.

42. Jim Stewart, Executive Chairman, Bioenergy Producers Association

One of the sleepers in this year's poll, the unabashedly modest Jim Stewart who has been leading the fight in California on the policy front for the Bioenergy Producers Association. Jim writes: "We have been fighting major battles in California on behalf of this industry and encountering "head in the sand" opposition in the legislature and with environmental organizations in this state for the past six years, while, at the same time, weighing in on national issues. However, I had no idea that our efforts would have a high enough profile nationally for my name to appear on this list.” Ah, grasshopper, Digest editors are remarkably fallible, but Digest readers know all.

43. Hugh Grant, CEO, Monsanto

Hugh Grant of Hollywood never wins an Oscar and Hugh Grant of Monsanto doesn’t get much respect from the legions of enemies of the US corn monoculture – but where would we be without the productivity of modern agriculture? Monsanto, says some, has much to answer for, but it rarely gets the credit the company deserves for developing high-margin, high-productivity options for farmers. In some ways, a victim of its success, and Grant has been keeping his eye focused on making sure that profitability ball keeps a’rollin’.

44. Lee Lynd, PhD, Professor of Engineering, Dartmouth College

Rating high among the academics in the poll, the Czar of Consolidated Bioprocessing himself, Lee Lynd, who hangs out at Dartmouth spitting out technologies that form the basis of Mascoma’s technologies, as well as working globally on the development of sustainable renewable fuels.

45. Alwin Kopse, Exec. Director, Roundtable on Sustainable Biofuels

Speaking of sustainability, Alwin Kopse is hardly a household name in global media, but in helming a fractious coalition of producers, end-users, environmentalists and NGOs into the Roundtable on Sustainable Biofuels – he does fine work at a thankless task that has enormous consequences for the industry and the planet. Some compare the task to herding cats, but herding neutrinos might be a more appropriate image. Kopse and his crew have been getting it done, always with grace and usually with apolmb.

46. Dan Adler, California Clean Energy Fund

As we wrote last month in “22 people worth knowing in bioenergy”: Dan and I were introduced by Digest staffer Michael Theroux. I had asked Michael to tell me the names of the people in California I should be at this fall’s event that I didn’t have on the preliminary list. Dan led the list. If you’ve not run across CalCEF in your travels, it is a $30 million nonprofit venture capital fund formed in 2004 to accelerate the development of promising early-stage clean energy technologies. To date, CalCEF has operated as a fund-of-funds in partnership with private investors, leveraging its funds in a broad pool of investable capital. Dan's a director of ACORE, and serves on the Clean Tech Open board, the leading business plan competition in the industry.

47. Arnold Klann, CEO, Bluefire Renewables

Arnie Klann and Bluefire Rewables have been fighting the good fight for a long, long time. Best known for putting together one of the most complete DOE Loan Guarantee package applications in history, behind the scenes he's been helping to organize the policy club known as Cellulosic Ethanol Association, and synchronizing messaging up in DC. A tireless advocate for renewables, and having richly-served success of late in developing his latest project in Mississippi.

48. Nancy Young, VP, Environmental Affairs, Air Transport Association / John Heimlich Chief Economist

In the development of aviation biofuels, a wide group of individuals has been instrumental through groups like CAAFI, SAFUG and in ad-hoc collaborative efforts. At the heart of it is the airline industry, which has been aggressively partnering in the R&D phase of new fuels development. Readers have recognized a wide selection of individuals and association execs, including John Heimlich and Nancy Young of the Air Transport Association, who we have paired at #48. Both have been tireless advocates for, and organizers of, the victories to date in the development and deployment of alternative aviation fuels.

49. Riggs Eckelberry, CEO, Origin Oil / Brian Goodall, PhD, CTO of OriginOil

The always quotable Riggs Eckelberry writes: It's official: we came in 49th out of the top 100 people in Bioenergy worldwide! I share this amazing rank with my able CTO, Brian Goodall. We are honored and thankful. Editor Jim Lane told us yesterday: "kudos – you had an amazing outpouring of support from the US-based Digest readership, and pretty good votes from Australia too, indicating that your Australian partnership has drawn attention there. If you voted, thank you – because it was no simple process, signing up for Biofuels Digest and then following your personalized link to vote for the Top 100. Whew!"

50. Jose Olivares, PhD, Director, National Alliance For Advanced Biofuels and Bio-Products

"It's the first time I've put a consortium of this size together," said Jose Olivares of the NAABB when we visited with him last spring for a profile on the consortium's work. "You learn as you go. We had several principles. One, inclusiveness, to make sure you had a broad perspective, from the national labs, academia and industry. Two, understanding the algae value chain as best as we could, and making sure we had good organizations in each area. The third, I think may be the one that made us click, was being transparent and being supportive. Not coming in with "mine is better than yours" but how could we build this together. When it came to the hard decisions, it made it possible to have an attitude that the "best outcome" was important. That helped."

51. Craig Venter, PhD, CEO, Synthetic Genomics / Emil Jacobs, VP R&D, ExxonMobil

As Will Thurmond wrote, "There are $600 million reasons we could reason why Synthetic Genomics is a key player In San Diego's Algae Culture Club. The first reason is the largest oil and gas company in the world, Exxon-Mobil, has commited the largest amount of money of any oil and gas firm in an R&D collaborative with Synthetic Genomics to leverage genetic pioneer Craig Venter's knowledge of applied science in molecular engineering."

52. Jim Dumesic, PhD, University of Wisconsin-Madison

If you've read much about Virent Energy Systems, the tdirect sugar-to-diesel technology known as bioforming, or the entire field of the catalytic conversion of feedstocks directlly into hydrocarbon fuels, you'bve been well exposed to the work from the Dumesic lab at the University of Wisconsin. Jim himself generally makes appearances at scientific conferences and is known to make technical presentations on new science, rather than grand pronouncements on biofuels policy. For that reason, it was a delightful surprise to see the

Digest readership get behind Dumesic and elevate him to #52 in our poll. Though microbial fermentation approach to direct conversion to hydrocarbons get the lion's share of publicity, the catalytic approach is attracting serious partners like Cargill Ventures and Honda.

53. Jim Matheson, General Partner, Flagship Ventures / David Berry, PhD, Partner, Flagship Ventures

Whether it is the direct-to-hydrocarbon strategy of an LS9, or the even more exotic "fuel from thin air" conversion of sunlight, CO2 and water directly into biofuels, Flagship has been at the bleeding edge of biofuels investment and company formation. We've paired Jim Matheson and David Berry at #53. One notable aspect of Flagship – they don't just invest in companies – they form them, with Joule being the result of their insights into the potential of new technologies to bypass biomass in the production of biofuels.

54. Richard Hamilton, CEO, Ceres

I interviewed Rich for the first time last spring, and promptly issued an invite to speak in San Francisco. I was fascinated, as I think you will be, by the knowledge that he and Ceres have developed on the long-term opportunities in bioenergy feedstocks. If affordable feedstocks are the key to successful projects – which anyone in the biodiesel or corn ethanol industry would agree to – then Ceres vision on the yields and geographies of feedstocks like miscanthus, switchgrass and energy cane should be a "must have" at any industry event.

55. John Doerr, Managing Partner, Kleiner Perkins

John Doerr, partner of Al Gore, Vinod Khosla, Tony Blair in the world of Kleiner Perkins, and a godfather of renewable energy, is a Silicon Valley legend who needs no introduction to most. But for those who needed a wake-up call on Doerr's prescient views on bioenergy could have got one looking at the $66M paycheck Doerr picked up, in the valuation of his holdings at the time of the Amyris IPO. With the stock up nearly 10 percent since the IPO, Doerr has cleared more in the past two weeks than many biofuels companies cost to seed and develop through to pre-pilot.

56. Steve Burrill, Managing Partner, Burrill & Co / John Hamer, PhD, Managing Director, Burrill & Co / Roger Wyse, Managing Director / Greg Young, Managing Director

At #56, we've paired a quartet of partners and investors at Burrill & Company, who expanded out of a key position in life sciences and into biofuels, and have been notable in the development of Gevo, Cobalt Technologies, Chromatin and other key players. They are also noted for key roles played in industry associations like BIO, and at industry events such as the Advanced Biofuels Leadership Conference, as well as conducting a series of their own industry events and publishing a lot of research on industry trends.

57. Bill Roe, CEO, Coskata / Wes Bolsen, CMO Coskata

In the world of bioenergy, one of the most energetic and outspoken presenters 'on the circuit' is Coskata's Wes Bolsen. One of the handful of people in the business residing outside of DC who has an authentically informed view on the progress or lack thereof in policy circles. We've paired Wes at #57 with CEO Bill Roe, who generally keeps a lower profile but has been steadily developing projects in Australia that may well lead to commercialization for the company that Roe said eare;ier this year was "ready and open for business".

58. Doug Cameron, CEO, Alberti Advisors

Known in the industry for key roles at Cargill and as Chief Science officer at Khosla and Piper Jaffray, Cameron has been working solo in recent months and has been added as a director at some of the industry's most notable plays. AT one stage or another he was acting CEO at Gevo, LS9 amnd Segetics, and remains on the SABs of Segetis and Mascoma as well as recently being added at Bioformix.

59. Tom Foust, PhD, NREL; Director, National Advanced Biofuels Consortium

Tom Foust gives one of the most clear, concise and yet comprehensive 30-minute overviews of the state of play in advanced biofuels development we've ever experienced. It's low key but packs a punch and has a message. You could say the same about the National Advanced Biofuels Consortium that he organized, and which won a major R&D consortium grant from DOE this past year. One of the gurus of colloborative bioenergy research.

60. Al Darzins, PhD, NREL / Philip Pienkos, PhD, NREL

Two of the real movers and shakers on algae at the National Renewable Energy Laboratory are Phil Pienkos and Al Darzins – regulars at industry conclaves like the Algal Biomass Summit, where they play spotlighted roles, and organizing the effort at NREL on algal-based biofuels, which has gone from a near standing (re)start to a fast-moving, evolving machine in recent years. We've paired them at #60 as they both pulled strong votes from algaescenti as well as the research community.

61. Robert Brown, PhD, Professor, Iowa State University

That one of the most comprehensive and compelling biofuels research centers is based in Iowa is not entirely surprising, but its still an impressive array of research on both first- and second-generation biofuels. Recently, Robert Brown was organizer of a well-received international conference on pyrolysis and other thermal and catalytic approaches to bioprocessing, and the wide priase heard there is reflected also in the heavy voting for Brown in this year's poll, where he placed among the top academics in the field.

62. Kristina Burow, Partner, ARCH Venture Partners / Bob Nelsen

The financial architects behind Sapphire Energy, they are also very much at the heart of the concept of solving, as they put it, "something really big and compelling" in the energy equation, and for that reason they put Sapphire together, and are backing it as it sticks to its premise of solving the fuel problem, rather than in branching off into the softer problems of base or intermediate chemicals. Both are active investors with impressive portfolios across clean tech, but its the intensity of the effort behind and around Sapphire that has drawn attention from voters and the industry.

63. Ganesh Kishore, PhD, CEO, Malaysian Life Sciences Fund

One of the "network nodes" in the biotech space – owing to his tenure at Monsanto and Dupont as well as in the Burrill family of funds, "Kish" Kishore has his own and significant following, and so for that reason we separated him out in the balloting from a cadre of Burrill VC who landed positions in the top 100. Heading the Malasian Life Sciences fund, his signature investment is Gevo, as the biobutanol pioneer heads for its IPO.

64. Stephen Mayfield, PhD, Professor, UCSD

Profiled by Will Thurmond earlier this week in the look at San Diego-based advanced biofuels, Mayfield has been another of those in the Sapphire Energy web as well as running a hub of algal biofuel research at UCSD.

65. John McCarthy, CEO, Qteros / Kevin Gray, CTO Qteros

Two refugees from Verenium, John McCarthy and CTO Kevin Gray, both picked up strong votes from readers in this year's poll, and we've paired them at #65. We suspect they might have polled even higher if their tenure at Qteros was not so relatively new. As we wrote in "25 people worth knowing in bioenergy": "If you happen to be in the market for a consolidated bioprocessing, ethanol-producing microbe, and your company is not named Mascoma, John's your guy. Interesting microbe always, the company has been very much more on the move this year. But John's worth knowing even if you're making biodiesel in a blender – his background at Verenium running the BP deal gives him a unique, valuable perspective on commercialization, partnering with giants, life as a public company, and the glories of the Celunol-Diversa merger. Besides, he's another of the Righteously Astutes on policy, and has been a go-to guy for "what needs to get done" on the the DC front, as well as in the lab and board room."

66. Javier Salgado, CEO, Abengoa Bioenergy

One of the top rated CEOs based outside the US, Salgado has been building not only an advanced biofuels platform in their cellulosic ethanol project in Kansas – they also own and operate a formidable set of first-generation assets in Europe.

67. Fred Cannon, PhD, CEO, KiOR

Anyone who gets US presidential hopeful and climate-skeptic Haley Barbour to call a special session of the Mississippi legislature to ram through $50 million in support for a new biofuels technology knows a thing or two about making things happen. That's precisely what Fred Cannon and KiOR have accomplished, practically before getting out of the lab. Their pyrolysis technology is emerging, but their ability to get attention, has gotten attention.

68. Bill Glover, MD, Environmental Strategy Boeing

Whether made from jatropha, algae, soybeans, coconut oil or camelina, Bill Glover and his colleagues at Boeing have been figuring out ways to put a wide assortment of renewable fuels into Boeing jets, certify them, and assemble the partnerships necessary to build the supply chain. Most prominently associated with the development of algal aviation fuels through Boeing's active membership in the Algal Biomass Organization, he's been less visible though just as active in the development of camelina-based jet fuels and utilizing other feedstocks.

69. Tom Baruch, CEO, CMEA

As we wrote in "25 people worth knowing in bioenergy": "In addition to being one of the most experienced VC in the country – and that's saying something – Tom has been an integral part – as Codexis chairman – of the first successful bioenergy IPO in several years. How they got it done, and Yom's views on the state of play in advanced bioenergy as it moves from demo stage towards the large capital calls that are required in the commercialization stage…well, for sure I will be sitting in the audience furiously taking notes."

70. Heather Brodie, CEO, Biofuels Association of Australia

If you've noted the aggressive growth of bioenergy activity in Australia – whether it is developing algal-based fuels and chemicals, advanced sugarcane based ethanol and diesel, or ethanol from municipal solid waste, BAofA has been one of the most successful trade organizations around the globe in helping to create the public-private partnerships that drive renewable fuels. Also, a good communicator in terms of driving interest in Australia among project developers and technologies.

71. David Aldous, CEO, Range Fuels

Range Fuels has been practically back in stealth mode in 2009-10, focused less on proseletyzing for renewable fuels and more on delivering at its Soperton, Georgia facility. The good news – Range is up and running at a 4 Mgy demonstration level, now transitioning from methanol over to ethanol. In terms of gasification-based advanced biofuels, it has seized and now held first-mover advantage, and with its focus on wood-based biofuels will find itself with some additional advantages in building on existing infrastructure for assembling feedstock. Delivering the Range project in these nefarious economic times has been no small achievement for Aldous, even though the company has been disinclined to crow about it.

72. Jim Imbler, CEO, ZeaChem

As we wrote in "25 people worth knowing in bioenergy": "Jim's been one of the most accessible CEOs in cellulosic ethanol, always available for a quote. More importantly, you can go to school on his knowledge of refining operations, and I have availed myself of the opportunity from time to time. I asked Jim to speak this time not only because he's a good storyteller, but because ZeaChem was fuels and chemicals before everyone went for co-products, had a low-cost approach before "capital light" was all the rage, and has an excellent analysis of the chems markets and the process of achieving scale-up while staying solvent."

73. Bryan Willson, CTO Solix / Doug Henson CEO

We've paired the two key players at Solix at #73 – one of the most highly-rated duos in the algal fuels and chemicals race, and certainly #1 among those developing a closed-bioreactor system on an own-and-operate basis. Amidst all the ups-and-downs of developing an entire algal fuels supply and processing chain, they managed to hit the milestones that keep their project funded and moving, and are developing in partnership with the Ute indian tribe in southwestern Utah. Brilliant step, utilizing tribal access to capital, land and water while providing opportunities for economic diversification to the tribes.

74. Bill Brady, CEO, Mascoma

Bill Brady is relatively new to Mascoma, but he's been busy for sure. As he told the Digest recently, "We've been at it for months. When I first arrived at Mascoma in January, I looked at the companies in the space, and saw some really impressive technologies. But it was too fragmented for the task at hand. I felt that for biofuels companies to succeed, we had to start putting technologies together, into larger more formidable companies." Since then he pulled off the acquisition of SunOpta's biofuels unit, which specializes in pretreatment. About advanced biofuels, he says simply: "The world doesn't really change unless someone unlocks the potential of cellulose. That means changing the recalcitrance. In the end, cellulose has to be at or below the cost of processing corn."

75. Bill Lese, MD, Braemar Energy Ventures

A veteran VC with 20+ years in the energy and environmental businesses, the co-founder of Braemar is an investor in a widerange of the the hottest companies in bioenergy. He currently serves on the board of directors of OPX Biotechnologies, and Solazyme, and as a board observer for Enerkem, and previously invested in signature cleantech companies like Verenium and Enernoc. Before Braemar, he was investing in emerging technologies for converting industrial waste streams into value-added products. For sure, one of the go-to nodes in cleantech investment.

76. Rick Wilson, CEO, Cobalt Technologies

As we wrote in "25 people worth knowing in bioenergy": "Although Rick generally presents on the technology and commercial timelines for Cobalt, in a side conversation he's worth flagging down just to learn what he knows about hedging out upstream feedstock risk in bioenergy development. This biobutanol early-stage company has been in our "50 Hottest Companies" for two years running, and yet I have always considered them a vastly underrated company – overall, biobutanol as a whole has been more overlooked than understood. In this case, we have an opportunity to look at the renewable chemicals side of the equation, with Cobalt focused on a smaller-scale early commercialization focused on high value chems."

77. Matti Lievonen, CEO, Neste Oil

Neste, like other companies developing renewable diesel solutions, has been getting less attention from the industry than it certainly merits. Their projects are huge, getting done off the balance sheet of a major oil player, and are in the "here and now" as opposed to the 2020s and 2030s. Just this month, the company is pivoting from its massive Jurong Island project in Singapore and moving towards a renewable diesel project in Finland.

78. Pramod Chaudhari, Chairman, Praj Industries

The #1 figure in the Indian subcontinent is Praj Industries chairman and founder Pramod Chaudhari. As we s=wrote last year, "Pramodh Chaudhari gives a crystal clear analysis of the sugar/molasses problems India has experienced recently and the two regulatory steps necessary to fulfill the E20 mandate. He also gives a very interesting description of how Praj solved the ethanol wastewater problem, and of the environmental education, conservation and outreach programs the company is running for its own employees, schools and its home city of Pune."

79. Jack Oswald, CEO, SynGest

As we wrote in "25 people worth knowing in bioenergy": "In addition to running a remarkable project proposing to process renewable biomass into ammonia – thereby replacing one of the most costly fossil-based inputs from the bioenergy value chain – Jack has contributed broad industry visions several times this year to the Digest. His thoughts on the importance of aiming for "energy abundance" as opposed to simply meeting the projected needs of the future, are a conference unto themselves, and his "cornucopia" model for meeting energy and feedstock needs of the future is perhaps the most significant vision laid down in the past 3 years by someone who is in the actual business of developing energy projects."

80. Bill Hagy, Director, USDA Director of Alternate Energy Policy / Dallas Tonsager, USDA Under Secretary for Rural Development

At #80, we paired both Bill Hagy and Dallas Tonsager, who polled strongly in the write-in ballots – and likely would have secured a higher slot if better known among international voters. As we wrote on Bill Hagy's prospective address at Advanced Biofuels Markets next month: "As director of the USDA's bioenergy policy team, I can think of a boatload of reasons why every person in the industry should take notes on his views of the path forward. But also, we have the USDA bioenergy roadmap just out this summer, and this is one of the first opportunities the industry will have to interact at the high-level with USDA on the practical aspects of converting that vision into practical rural development."

81. Lonnie Ingram, PhD, Professor, University of Florida

One of the most popular figures among the academic community, cellulosic ethanol pioneer Lonnie Ingram, whose lab produced much of the magic behind Verenium's technology, is less well known in the broader global bioenergy industry, but nevertheless held down one of the highest-rated positions among academics. A popular speaker in

Florida, he has made fewer forays onto the international stage of late, but his work in teasing sugars out of cellulose remains influential and leading-edge.

82. Sean O'Hanlon, Executive Director, American Biofuels Council

As well as being one of the best-known and respected of the biofuels Twitterati, Sean has been advocating at the grass-roots, and offering advanced bioenergy insight on a consulting basis, for a number of years. "I can't think of anyone who taught me more about the potentials and pitfalls in biofuels," says Digest editor Jim Lane.

83. Kirk Haney, CEO, SG Biofuels

A recovering teak plantation developer, Kirk Haney and his team at SG Biofuels has been busy defining what we mean when we talk about "Jatropha 2.0". Assembling a world-class portfolio of partners in R&D, and the widest collection of jatropha accessions around, Haney will tell you that "Jatropha 1.0 didn't fail – the jatropha 1.0 business model failed" and has been steadily repairing that failure as his team prepares a platform for genetically localized and optimized jatropha, just as the demand for high-yield, low-impact renewable oils skyrockets.

84. Joanne Ivancic, Exec Dir, Advanced Biofuels USA

One of the most visible of the NGOs working on popularizing advanced biofuels, Joanne has been a high-value advocate and information distributor for the niches as it begins to educate consumers about the opportunities in advanced feedstocks, processing technologies and fuels,

85. John Scott, CEO, PetroAlgae

As head of biofuels' most recent IPO candidate, John Scott's team has been a pioneer in establishing lemna as a candidate biofuels platform feedstock. The company's demonstration and customer sales center in Florida is also the earliest nexus for the commercialization of biofuels microcrops.

86. Todd Taylor, Partner, Fredrickson & Byron

One of the more popular of the biofuels Twitteratri as well as chairman of the program at next year's Algal Biomass Summit, Todd's overall perspective runs across a gamut of cleantech technologies, but he's best known in the algae field, where he is an ubiquitous presence both online and offline, and a go-to source for the scoop on what's hot, smart and getting traction.

87. Rafaello Garofalo, Secretary General, European Biodiesel Board

One of the higher-ranked European indusrty leaders, Garofalo has been leading not only the EBB but also pioneered the establishment of the European Algal Biomass group. Along with eBIO, he led a controversial walk-out from the Roundtable of Sustainable Biofuels, saying that the RSB's principles were incompatible with the needs of his membership. Occasionally controversial but always an entertaining industry presenter.

88. Bliss Baker, MD, Global Renewable Fuels Alliance

The Global Renewable Fuels Alliance is a newer organization, but Bliss Baker has created a fairly strong stream of noise from the group, coordinating on a variety of policy issues whole also being a strong defender on biofuels on food-vs-fuel issues. Recently, the GRFA challenged the UN to reveal the true impact that crude oil prices have on food pricing and recognize that our heavy reliance on crude imports is one of the leading causes of food inflation and price spikes. "The FAO has recognized a variety of drivers behind food price spikes, such as drought, energy prices and trade restrictions; however, the impact of crude oil prices on food inflation cuts across all national boundaries and has a disproportionate impact on food prices," said Baker.

89. Tim Cesarak, MD, Organic Growth Group, Waste Management

Tim Cesarak serves on the Enerkem board and is MD of the strategic investment arm of Waste Management. Enerkem, as you may recall, has broken ground on its first commercial-scale advanced biofuels plant, putting it in the lead in terms of developing advanced biofuels from MSW. Meanwhile, WM has invested in Enerkem, Terrabon, S4 and others – their vision on turning waste streams into revenue streams is worth hearing, and possibly worth a partnering discussion

90. Philip Wolfe, Chairman, Ownergy (UK)

Philip Wolfe, a recognised pioneer of the renewables sector since founding BP Solar in the 1970s, is Ownergys chairman and business development director, and continues to be a popular face among Digesterati. In six high-profile years as Director General of the Renewable Energy Association (REA) he became the voice of renewable energy in the UK. Philip was a leading light of the campaign for the Tariffs and authored the first design blueprint presented to Ministers soon after the Energy Act was passed. He continues to work with many others in the industry through participation in the Energy Saving Trust's Microgeneration Advisory Board and the REAL Code Panel, and his ongoing non-executive directorship of the REA.

91. Phil Bredesen, Governor of Tennessee / Kelly Tiller, CEO Genera Energy, Tim Rials, University of Tennessee

One of the biggest write-in votes we had was for this trio, instrumental in the establishment and growth of Genera Energy. It's likely to be the most important feedstock play in the next couple of years – intended to benefit Tennessee, but pioneering models for the global industry as a whole. Shows that readers know more than nominators – and we've paired the trio at #91.

92. John Benemann, PhD, CEO, Benemann Associates

The "Doctor No" of the algae industry, if he spends a lot of his time talking down the hype around algae, its more to do with the hype than a problem with algae. A co-author of the close-out report of the DOE's Aquatic Species Program, he's been instrumental in the formation of the Algal Biomass Organization. If John says its good, that's rare, but it's gold.

93. Brian Bilbray / Harry Teague / Jay Inslee / Dave Reichart / Mary Bono Mack, US House of Representatives

This stranger's quintet of House members we've paired at #93 – a trio of Republicans and two Democrats – they're mutually wild about algae and were instrumental in house legislation that passed last summer to give parity to algae within the Renewable Fuel Standard.

94. Bill Holmberg, ACORE Biomass Coordinating Council

One of the more popular association execs is a long-time soldier in the trenches of renewable energy – Bill Holmberg has been a leader over the long haul, and has the battle scars to show it. But he's one general popular with the troops, and has been a key figure not only in the biofuels policies of the American Council on Renewable Energy, but also the biomass to power side.

95. Charles Wyman, Professor, UC Riverside

Charles Wyman was a co-founder of Mascoma among other projects, and before his gig at Riverside was head of the gang at the National Renewable Energy Laboratory. Landed one of the highest vote totals on the ballot among researchers, though better known in the US than globally.

96. Gary Luce, CEO Terrabon

"My view," explains Luce, "in this industry you really have to create a technology not only that adds value, but really enables the feedstock supplier to do something fundamentally different. In our case, creating drop-in fuels at the refinery rather than at the terminal, we offer some extra degree of freedom at the refinery level, and that's been attractive to our partners."

97. David Tilman, PhD, Professor, University of Minnesota

One of the most popular write-ins in the informal balloting, David Tilman also secured one of the higher ranks among researchers and joins the list at #97. A co-author of "Beneficial Biofuels—The Food, Energy and Environment Trilemma," from Science, was David Tilman's product after a year of conversations and debate among some of the nation's leading biofuel experts. The writers include some of the leading lights in cellulosic conversion, and the critique of first-generation fuels. In addition to Tilman, the article contributors include the U of M's Jonathan Foley and Jason Hill; Princeton's Robert Socolow, Eric Larson, Stephen Pacala, Tim Searchinger and Robert Williams; Dartmouth's Lee Lynd; MIT's John Reilly; and the University of California, Berkeley's Chris Somerville. "The world needs to replace fossil fuels with renewable energy, but recent findings have thrown the emerging biofuels industry into a quandary. We met to seek solutions," wrote Tilman. "We found that the next generation of biofuels can be highly beneficial if produced properly."

98. Michael Wang, Argonne National Laboratory

The author of the GREET model for measuring direct land use change and emissions impact, and also a leading indirect land use change-skeptic who has been helping to organize the ILUC-skeptics response, which has focused on the development of more robust models for ILUC.

99. Hunt Ramsbottom, CEO, Rentech

One of the pioneers on aviation biofuels and drop-in fuels in general, Hunt Ramsbottom has pioneered one of the most extensive airline deals – supplying drop-in fuels to airports at LAX and to a consortium of airlines. Picked up strong DOE support in a project partnered with Clear Fuels, and has been leading the opposition to California Proposition 23 that would rollback much of the legislation that has established the California Low Carbon Fuel Standard.

100. Brian Foody, CEO, Iogen

Foody has been letting others play in the limelight at Iogen, but the Shell- and PetroCanada-backed project is at the cusp of moving from a six-year pilot to demonstration and commercial-scale. The company has been toughing it out with improving yields and reducing capital costs on corn stover conversion, after initially working on woods. Shell calls 2011 “a year of decision” and Iogen could go far in the new year.

THE ADVANCED BIOFUELS TRACKING DATABASE

Projected production volumes, 2009-2015 (in millions of gallons per year)
Source: Biofuels Digest

	2009	2010	2011	2012	2013	2014	2015
Abengoa	0.00	0.00	0.00	0.00	15.00	15.00	15.00
ADM	0.00	0.00	0.00	1.00	1.00	1.00	1.00
AE Biofuels	0.01	0.02	0.05	10.04	10.05	10.05	10.05
Algenol	0.01	0.30	0.30	0.40	250.40	750.40	750.40
AltAir	0.00	0.00	0.00	100.00	100.00	100.00	100.00
American Process	0.00	0.00	0.89	0.89	0.89	0.89	0.89
Amyris	0.01	0.01	0.02	1.02	27.02	27.02	27.02
Aquatic Energy	0.00	0.00	0.03	0.03	0.03	0.03	0.03
Aurora Algae	0.01	0.01	0.01	0.50	0.50	0.50	0.50
BioTfuel	0.00	0.00	0.00	0.02	0.02	0.02	0.02
BioProcess Algae	0.00	0.00	0.01	0.01	0.01	0.01	0.01
BlueFire Renewables	0.01	0.01	3.91	3.91	22.91	22.91	22.91
BP Biofuels	1.40	1.40	1.40	37.40	37.40	37.40	37.40
British Airways	0.00	0.00	0.00	0.00	0.00	19.00	19.00
Buckeye Technologies/University of Florida	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Butalco	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Butamax	0.00	0.50	0.50	80.50	160.50	160.50	160.50
Chemopolis	0.00	0.00	1.20	3.70	3.70	3.70	3.70
Chemrec	0.00	0.58	0.58	0.58	40.58	40.58	40.58
Choren	0.00	4.10	4.10	4.10	4.10	4.10	4.10
Clearfuels	0.00	0.00	0.07	0.07	0.07	0.07	0.07
Clearfuels	0.00	0.00	0.00	0.00	0.00	20.00	20.00
Clearfuels	0.00	0.00	0.00	0.00	0.00	0.00	18.00
Cobalt	0.01	0.01	2.01	102.01	102.01	102.01	102.01
COFCO/Sinopec	0.00	0.00	3.00	3.00	3.00	3.00	3.00
CORE BioFuel	0.00	0.00	0.00	4.40	17.80	17.80	17.80
Coskata	0.05	0.05	0.05	55.05	55.05	55.05	55.05
DDCE	0.00	0.25	0.25	0.25	0.25	0.25	0.25
Dynamic Fuels	0.00	75.00	75.00	75.00	75.00	75.00	75.00
Dynamotive	0.01	1.01	1.01	1.01	1.01	1.01	1.01
Enerkem	1.30	1.30	11.30	11.30	21.30	21.30	21.30
ENN	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Ensyn	0.00	0.00	0.00	0.00	0.00	0.00	316.00
Fiberight	0.00	0.01	6.00	6.00	6.00	6.00	6.00
Fulcrum	0.01	0.01	0.01	10.51	10.51	10.51	10.51
Gevo	1.00	1.00	1.00	16.00	300.00	300.00	300.00
Greenfield Ethanol	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Green Star Products	0.00	0.00	0.00	2.00	2.00	2.00	2.00
Haldor Topsoe	0.00	0.00	0.00	0.80	0.80	0.80	0.80
HCL Clean Tech	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Idemitsu Kosan	0.00	0.00	0.00	0.00	0.01	0.01	0.01
Inbicon	1.40	1.40	1.40	19.40	19.40	19.40	19.40
IneosBIO	0.00	0.00	8.00	8.00	8.00	8.00	8.00

Iogen	0.48	0.48	23.48	23.48	23.48	23.48	23.48
Joule	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Kent BioEnergy	0.01	0.01	0.01	0.01	0.01	0.01	0.01
KiOR	0.00	0.23	0.23	0.23	80.00	80.00	120.00
KL Energy	1.30	0.00	1.30	1.30	1.30	1.30	1.30
Kumho Petrochemical	0.00	0.00	0.39	0.39	0.39	0.39	0.39
LanzaTech	0.01	0.51	0.51	1.51	40.00	40.00	40.00
Lignol	0.01	0.02	0.02	0.02	0.02	0.02	0.02
LiveFuels	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Logos Technologies	0.00	0.00	0.00	0.80	0.80	0.80	0.80
LS9	0.01	0.10	10.10	10.10	10.10	10.10	10.10
Mascoma	0.20	0.20	0.20	0.20	20.20	20.20	20.20
MBD Energy	0.00	0.00	0.01	0.01	3.00	3.00	3.00
Murphy Oil	0.00	0.00	0.00	115.00	115.00	115.00	115.00
National Research Council	0.00	0.00	0.01	0.01	0.01	0.01	0.01
National Technological University	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Naturally Scientific	0.00	0.01	0.01	0.01	10.01	20.01	20.01
Neste Oil	109.00	332.00	562.00	562.00	562.00	562.00	562.00
OriginOil	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oxford Catalysts	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Petrobras	0.00	0.00	0.00	0.00	4.00	4.00	4.00
PetroAlgae	0.12	0.12	0.12	70.12	140.12	210.12	210.12
Phycal	0.00	0.00	0.01	0.01	0.01	0.01	0.01
POET	0.02	0.02	0.02	25.02	25.02	25.02	25.02
Pond Biofuels	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Powers Energy	0.00	0.00	0.00	0.00	160.00	160.00	160.00
Praj MATRIX	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Queensland Algal project	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Queensland University of Technology	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Range Fuels	0.00	4.00	4.00	4.00	20.00	20.00	20.00
REII	0.02	0.02	0.02	0.35	0.35	0.35	0.35
Rentech	0.15	0.15	0.15	0.15	8.15	259.00	259.00
Sapphire Energy	0.01	0.20	0.02	0.02	0.02	0.02	0.02
Scottish Bioenergy	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Seambiotic	0.01	0.01	0.01	0.01	0.01	0.01	0.01
SEKAB	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Solazyme	0.10	0.10	0.15	100.10	100.10	100.10	100.10
Solix	0.01	0.01	0.01	0.01	0.01	0.01	0.01
St1 Biofuels Oy	0.00	0.00	0.01	0.01	0.01	0.01	0.01
Terrabon	0.00	0.10	0.10	1.25	5.00	25.00	25.00
ThermoChem Recovery (TRI)	0.00	0.01	0.01	0.01	0.01	0.01	0.01
TMO Renewables	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Trenton Fuel Works	0.00	0.00	0.00	0.00	0.00	3.87	3.87
UK Carbon Trust Algae consortium	0.00	0.00	0.01	0.01	0.01	0.01	0.01
UK Carbon Trust pyrolysis consortium	0.00	0.00	0.00	0.00	0.00	0.01	0.01
UOP-Aquaflow Bionomic	0.00	0.00	0.01	0.01	0.01	0.01	0.01
UPM-Kymmene/Metso	0.00	0.00	0.00	0.68	0.68	0.68	0.68
US Biofuels	0.12	3.80	5.90	10.50	25.30	25.30	25.30

Virent	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Weyland / Statoil Hydro	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Woodland Biofuels	0.00	0.00	0.02	0.02	0.02	0.02	0.02
ZeaChem	0.00	0.25	0.25	0.25	0.25	0.25	0.25
	116.88	**429.46**	**731.37**	**1486.68**	**2651.90**	**3545.63**	**3919.63**

THE ADVANCED BIOFUELS TRACKING DATABASE

Companies, location, fuel, process, feedstock (US) Renewable Fuel Standard qualifying category, and project descriptions.
Source: Biofuels Digest

Please note, projects are profiled in the following order:

Project Name
Location
Fuel
Process
Feedstock
RFS category
Project Description

Abengoa
Hugoton, Kansas, USA
Ethanol
Enzymatic hydrolysis
Corn stover
RFS category: Cellulosic biofuel
In Kansas, Brighter Energy.org is reporting that Abengoa Bioenergy is on track to be operational at its proposed Hugoton-based cellulosic ethanol plant by 2013, and said that it has contracted for as much as 60 percent of the feedstock needed to supply the plant.

ADM
Decatur, Illinois, USA
Ethanol
Enzymatic hydrolysis
Corn stover
Cellulosic biofuel
Estimate 1 Mgy from Decatur IL demo to produce ethanol/ethyl acetate, received $25 M DOE grant in 2009

AE Biofuels
Butte, Montana, USA
Ethanol
Enzymatic hydrolysis
Corn stover
Cellulosic biofuel
160,000 gpy pilot open in Butte, MT; Keyes CA plant 500,000 gallon capacity. "We are in the process of moving our existing 160,000 gallon commercial demonstration facility from Montana to California. We are awaiting a $3.2 million matching grant from the California

Energy Commission before re-commissioning in California. The California facility will have expanded capacity, with the initial production comprising 500,000 gallons."

Algenol
Puerta Libertadad, Sonora, Mexico and Teaxs
Ethanol
Algae fermentation
Algae
Advanced Biofuel
100,000 gpy 2012 Dow project; 2013 250 Mgy Biofields; estimated production from existing pilot 10K; 300K demo in Ft Myers FL 2010

Altair
Anacortes, Washington, USA
Renewable Drop-in fuel
Hydroprocessing
Camelina
Advanced Biofuel
Anacortes plant opening 2012 (Tesoro is partner)

American Process
Alpena, Wisconsin, USA
Ethanol
Enzymatic hydrolysis
Advanced Biofuel
DOE $25M grant in 2009 for 890K gallon project in Alpena, MI

Amyris
Emeryville, California, USA
Renewable drop-in fuel
CBP
Sugar
Advanced Biofuel
10,000 open (Brazil) 2011 commercial (capacity 26 Mgy for Buge, Cosan/Shell and Guarani project); 1 Mgy (est) from $25M DOE grant for pilot in Emeryville, CA opening in (est) 2012

Aquatic Energy
Louisiana, USA
Renewable oils
Algal oil extraction
Algae
Advanced Biofuel
12 acre algae demonstration facility, and addition of key science and advisory staff.

Aurora Algae
Vero Beach, Florida, USA
Biodiesel
Algae transesterification
Algae
Biomass-based diesel
FL pilot (estimate production from 2 acres); demonstration scale planned for Western Australia (capacity and dates are Digest estimates)

Biotfuel
France
Renewable Drop-in fuel
Advanced Biofuel
Five French partners and Uhde have launched biotfuel, a $155.1 million project that uses the Fischer-Tropsch process to convert torrified wood biomass into drop-in renewable fuels. The group will launch two pilot projects in France, that will commence operation in 2012.

Bioprocess Algae
Shenandoah, Iowa, USA
Biodiesel
Algae transesterification
Algae
Advanced biofuel
Green Plains Renewable Energy and bioprocess Algae announced plans for Phase II of the Grower Harvester algae project at Green Plains' Shenandoah, Iowa ethanol plant. Phase II construction is expected to start in the next two weeks and there are plans to scale the technology 20 times larger than the initial Phase I of the project.

Bluefire Renewables
Lancaster, California, USA
Ethanol and renewable chems
Acid hydrolysis
MSW
Cellulosic biofuel
Lancaster CA plant is 3.9 Mgy; additional project in MS in 19 Mgy - est opening in 2013 - added EPC, offtake and feedstocks contracts in recent months

BP Biofuels
Jennings, Louisiana, USA
Ethanol
Enzymatic hydrolysis
Bagasse

Cellulosic biofuel
1.4 Mgy open 36 Mgy 2012. 50 percent stake sold to BP by Verenium in 2010.

British Airways
East London, Middlesex, UK
Renewable Drop-in fuel
FT
MSW
Cellulosic biofuel
19 Mgy Fischer-Tropsch plant scheduled to open East London, 2014

Buckeye Technologies/University of Florida
Perry, Florida, USA
Ethanol
Enzymatic hydrolysis
Cellulosic biofuel
The project is a joint venture of the University of Florida (UF), Buckeye Technologies Inc and the Florida Legislature, which provided $20 million in funding.

Butalco
Germany
Biobutanol
Cellulosic biofuel
Pilot operating in Germany (2010)

Butamax
Hull, UK
Biobutanol
Fermentation
Corn
Cellulosic biofuel
BP and Dupont have been in joint R&D for 7 years, and the last five focused on biobutanol; The UK demonstration plant commissions in Q3 2010. Entering the US market and be commercially viable in late 2012 and early 2013, and Brazil in 2013. Volumes are Digest estimates based on retrofits of 100 Mgy ethanol plants to 80 Mgy of butanol.

Chemopolis
Oulu, Finland
Ethanol
Ag, paper waste
Cellulosic biofuel
The company has invested $24.4 million in its 68 tons per day facility, which also functions as a development and marketing centre for testing customer-sourced raw

materials, and for producing sample batches of bioethanol, biochemicals, and papermaking fibers. Chempolis has signed a $73 million license and EPC agreement with Tianjin Jiuqian Paper Co Ltd. To supply three formico biorefineries, each capable of producing 100,000 t/a of bleached wheat straw pulp. The new plants are scheduled to start up in 2012-2013. The digest estimates that half of tonnage will be used for fuel production.

Chemrec
Pitea, Sweden
BioDME
Black liquor gasification
Black liquor
Advanced Biofuel
Chemrec opened it pilot biodme plant at the Smurfit Kappa paper mill in Piteå, Sweden. This pilot plant is part of the biodme project where the production of biodme and its use in heavy trucks is demonstrated.

Choren
Frieburg, Germany
Renewable Drop-in fuel
FT
Advanced Biofuel
BTL plant 156000 tonnes to open in Freiburg Germany in 2010

Clearfuels
Commerce City, Colorado, USA
Renewable diesel/jet
Steam reform/FT
Woodwaste/bagasse
Advanced Biofuel
Clearfuels -Rentech joint demonstration project in Colorado at Rentech PDU site, Commerce City, partially funded by DOE.

Collinswood, Tennessee, USA
Renewable diesel/jet
Steam reform/FT
Woodwaste
Advanced Biofuel
Clearfuels has announced itas first commercial project in TN for about 20MGPY renewable diesel from woodwaste to be operational in 2014

Hawaii, USA
Renewable diesel
Steam reform/FT
Bagasse/cane trash

Advanced Biofuel

Cobalt
Sausalito, California, USA
Biobutanol
Fermentation
Corn
Cellulosic biofuel
Pilot est 10,000 gpy open 2 Mgy demo open 2011; 100 Mgy 2102 (biobutanol)

COFCO/Sinopec
China
Ethanol
Enzymatic hydrolysis
Corn stover
Cellulosic biofuel
In May 2010, Novozymes, COFCO, and oil refiner Sinopec, signed a MOU for the construction of a cellulosic ethanol demonstration plant by COFCO and Sinopec, which Novozymes will supply with enzymes.

CORE biofuel
Houston, B.C. Canada
Gasoline
Gasification
Wood Waste

Coskata
Location TBD – southeastern US and Australian locations under consideration
Ethanol
Gasification
Multi-feedstock
Cellulosic biofuel
55 Mgy plant - published target opening is 2012, no month.location "in the Southeast" - revised down from 100 Mgy per Wes Bolsen interview 03/10

DDCE
Vonore, Tennessee, USA
Ethanol
Enzymatic hydrolysis
Corn cob
Cellulosic biofuel
250,000 gpy YE 2009 - no timelines on commercial scale announced

Dynamic Fuels

Geismar, Louisiana, USA
Renewable diesel
FT
Animal wastes
Advanced Biofuel
75 Mgy renewable diesel plant under construction, slated for Q1 2010 opening

Dynamotive
West Lorne, BC
Canada
Bio-oil
Pyrolysis
Advanced Biofuel
West Lorne plant projects $1.5 million in sales for 2010; assuming 1 Mgy

Enerkem
Quebec, Canada
Ethanol
Gasification
Cellulosic biofuel
1.3 Mgy Quebec open 10 Mgy Alberta 2011 (est); 2nd project in Mississippi est 10 Mgy and estimated 2013 open, received $50MM DOE grant in 2009

ENN
Location TBD
Biodiesel
Algae transesterification
Biomass-based diesel
Algal fuels pilot open 2009 - capacity estimated

Ensyn
TBD, Malaysia
Renewable Drop-in fuel
Fast pyrolysis
Palm waste
In Malaysia, the national government has announced a deal to construct nine fast pyrolysis plants by 2015, using Ensyn and UOP technology, that will convert palm waste into 316 Mgy of gasoline, diesel and jet fuel. Ensyn and UOP's joint venture, Envergent, will provide technical assistance to the project.

Fiberight
Blairstown, Iowa, USA
Ethanol
Enzymatic hydrolysis

MSW
Cellulosic biofuel
Opened pilot facility for MSW-to-ethanol in 2010. Following a total $24 million investment, the facility will be scaled to final commercial production capacity of approximately 6 million gallons of biofuel per year in 2011. In the UK, TMO Renewables has signed a deal with Fiberight in the US for a 20-year, $500 million deal to supply the American company with its proprietary GM bacteria used to break down MSW into biofuels. Fiberight claims that TMO's technology is three to five years ahead of the US, while TMO claims it could supply up to 50% of the US's second generation biofuel requirement under the RFS2.

Fulcrum
California, USA
Ethanol
Gasification
Cellulosic biofuel
10.5 Mgy 2012 Sierra Biofuels

Gevo
St Joseph, Missouri, USA and Minnesota
Biobutanol
Fermentation
Advanced Biofuel
1 Mgy pilot is biobutanol-producing plant, St. Joseph, MO with ICM. "Gevo's strategy is to retrofit ethanol capacity to produce butanol. Our 1 MGPY demonstration plant, built with ICM, our exclusive engineering partner for No. America, is operating in St. Joe, MO. We are currently in the market for and plan to bring 30-50 MGPY on line in 2011 and ramp up from there with a total of 500 MGPY in production by 2014. So, say: 50 MGPY in 2011; 150 MGPY in 2012 and 300 MGPY in 2013." Inn Minnesota, Gevo announced it has agreed to acquire the 21 Mgy Agri-Energy ethanol plant in Luverne, and will commence mechanical retrofitting of the plant to produce isobutanol. The company said that during most of the retrofit process, the facility will continue to produce ethanol, and that the conversion will be complete by Q1 2012.

Greenfield Ethanol
Chatham, Ontario, Canada
Ethanol
Enzymatic hydrolysis
Cellulosic biofuel
A small-scale pilot facility has been built at the Centre of Excellence to run more advanced tests once the initial laboratory trials are completed.

Green Star Products
TBD, Utah, USA

Biodiesel
Algae transesterification
Algae
Advanced Biofuel
Green Star Products announced it has signed a contract to build a biodiesel facility in conjunction with its West Coast-based Algae-to-Biodiesel project.

Haldor Topsoe
TBD
Ethanol
Enzymatic hydrolysis
Cellulosic biofuel
DOE $25M grant 2009 for 25 ton/day cellulosic demo

HCL Clean Tech
Durham, North Carolina, USA
Ethanol
Hydrochloric acid
Cellulosic biofuel
The pilot plant will be located at Southern Research Institute's Advanced Energy and Transportation Technologies Center in Durham.

Idemitsu Kosan
Japan
Biobutanol
Fermentation
Rice straw, corn stalks
Idemitsu Kosan announced that it is developing a biobutanol pilot plant that will open in 2013, in collaboration with the Research Institute of Innovative Technology for the Earth (RITE). The group said that it expected to commence commercial-scale production by 2020.

Inbicon
Kalundborg, Denmark
Ethanol
Enzymatic hydrolysis
Straw
Cellulosic biofuel
1.4 Mgy open 2009 Kalundborg, Denmark 18 Mgy open 2012 (est) Spiritwood complex ND

Ineosbio
Vero Beach, Florida, USA
Ethanol

Gasification-Fermentation
Cellulosic biofuel
2011 is announced demonstration date; 8 Mgy in Vero Beach, FL - $50M DOE grant in 2009

Iogen
Saskatoon, Saskatchewan, Canada
Ethanol
Enzymatic hydrolysis
Stover
Cellulosic biofuel
23 Mgy in Saskatoon in 2011 no month announced

Joule Unlimited
Leander, Texas, USA
Renewable Drop-in fuel
CBP
CO2
Advanced Biofuel
10,000 gpy (est) open 2011 (est) in Leander, TX

Kent Bioenergy
Mecca, California, USA
Renewable oils
Algal oil extraction
Algae
Advanced Biofuel
160 acre process development.production facility south of Palm Springs

KiOR
Columbus, Mississippi, USA
Renewable Drop-in fuel
Pyrolysis
Advanced biofuel
In Mississippi, the state legislature approved Governor Haley Barbour's special session request for a $75 million loan to kior for a proposed development of five biofuel plants in Mississippi by the Houston-based pyrolysis group. Kior committed to invest a total of $500 million of its own funds towards its first three projects, including sites in the northern city of Columbus, in the center of the state in Newton County, and near the city of Bude in the struggling southwestern section of the state. The Digest has esimtaed production volumes and completion dates based on the investment size and typical permitting and construction timetables.

KL Energy

Upton, Wyoming, USA
Ethanol
Enzymatic hydrolysis
Stover
Cellulosic biofuel
1.3 Mgy open in 2009; shut down in 2010 for retrofit.

Kumho Petrochemical
South Jeolia, Korea
Biodiesel
Algae transesterification
Algae
Biomass-based diesel
$17.6M pilot project by 2011 - 28.5Mgy commercial scale (no date) - partnership with Biosystems - project in South Jeolla

Lanzatech
North Island
New Zealand
Ethanol
Gasification
Steel waste gas (CO)
Cellulosic biofuel
10,000 gpy (est) open 500,000 gpy 2010 EOY 40 Mgy 2013

Lignol
Vancouver, BC, Canada
Ethanol
Enzymatic hydrolysis
Wood waste
Cellulosic biofuel
Pilot (estimated capacity 10K gpy) open Q2 2009; announced target is 53 Mgy commercial scale, no firm date. Lignol announced in May 2010 that it has met operability targets and has operated its pilot cellulosic ethanol plant 24 hours per day, 5 days per week in recent months.

Livefuels
Possibly Louisiana, USA
Biodiesel
Algae transesterification
Algae
Biomass-based diesel
Pilot 45-acre algae farm

Logos Technologies
USA
Ethanol
Enzymatic hydrolysis
Cellulosic biofuel
DOE $25M grant 2009 for 25 ton/day cellulosic demo; collaborating with edeniq in Corn-to-Cellulose Migration (CCM) program
LS9
Okeechobee, Florida, USA
Renewable Drop-in fuel
Fermentation of sugar by modified e.coli to renewable diesel
Sugar
Advanced Biofuel
Pilot SF (10K estimate) 100K demo in FL 2010 10Mgy commercial end of 2011 (Okeechobee FL)

Mascoma
Rome, New York, USA
Ethanol
CBP
Stover
Cellulosic biofuel
200,000 gpy Rome, NY open 20 Mgy - originally scheduled for 2012 with a "may flip to 2013" - has now (5/10) been officially backed up to 2013, citing financing delays

MBD Energy
Tarong Power Station, Queensland, Australia
Biodiesel
Algae transesterification
Algae
Digest estimates on timing. A $10 million algal fuel project jointly developed by Advanced Manufacturing Cooperative Research Centre, MBD Energy and James Cook University will be the base for a 3 Mgy (11 million liter), 200-acre (80 hectare) site that would consume up to 70,000 tones of CO2 from the Tarong Power Station.

Murphy Oil
Hereford, Texas, USA
Ethanol
Fermentation
Animal waste
Cellulosic biofuel
Murphy Oil has purchased the former Panda Ethanol facility in Hereford. Though the company did not disclose the purchase price, it did say it would complete construction of

the ethanol facility and should begin production within a year. Murphy Oil plans to use the 115 MGY plant to supply ethanol to its 1,000 retail fuel locations, most of which are Walmarts.

National Research Council
Ketch Harbour, Nova Scotia
Canada
Renewable oils
Algal oil extraction
Algae
Advanced Biofuel
Preliminary work and engineering plans have been drawn up to build a 50,000L cultivation pilot plant at the NRC Ketch Harbour Marine Research Station.

National Technological University
Mar de Plata, Argentina
Renewable oils
Algal oil extraction
Algae
Advanced Biofuel
The project is utilizing seawater from a Mar de Plata industrial cooling process and is projected to yield 856 gallons of algal oil per acre (8000 liters per hectare).The project, which commenced in 2008, is using flocculation and centrifuges for algae extraction and said it was using an undisclosed algal strain adapted for local conditions.

Naturally Scientific
China
Renewable oils
Plant cell culture
CO2
Advanced Biofuel
In April 2010, Naturally Scientific CEO Geoff Dixon said that his company had inked its first five commercial installations, a series of five $50 million projects that would be erected in China over the next five years. The Digest has estimated each project volume at 10 Mgy ($5 per gallon CAPEX) and projects that one will open in 2013 and one in 2014.

Neste Oil
Porvoo, Finland
Renewable diesel
Palm, Rapeseed oil, waste fat
*Advanced Biofuel - palm oil sourcing may cause compliance issues with RFS2
Nexbtl renewable diesel is currently produced at two plants at the Porvoo refinery in Finland, the first of which was completed in 2007 and the second in 2009, with a combined capacity of 380,000 t/a. Neste Oil is currently building two new nexbtl plants in

Singapore and Rotterdam, which are due to come on stream in 2010 and 2011 respectively. Representing a combined investment of around EUR 1.2 billion, these will be the world's largest renewable diesel plants when completed, with a combined capacity of 1.6 million t/a

OriginOil
Los Angeles, California, USA

Algae
See MBD Energy (strategic partner and customer for OO technology)

Oxford Catalysts
Gussing, Austria
Renewable Drop-in fuel
FT microchannel reactor
Woodchips
Cellulosic biofuel
Oxford Catalysts Group and SGC Energia announced that it has completing construction of its biomass-to-liquids (BTL) demonstration plant in Gussing.

Petrobras
TBD, Brazil
Cellulosic ethanol
Enzymatic hydrolysys
Bagasse
KL Energy and Petrobras announced that they have entered into a Joint Development Agreement to jointly optimize KLE's proprietary cellulosic ethanol process technology for sugarcane bagasse feedstock. As part of this agreement, The companies also said that they will develop a 4 Mgy bagasse-based cellulosic ethanol project that will be co-located with a Petrobras-owned sugarcane mill, which will come online in 2013.

PetroAlgae
Fellsmere, Florida, USA
Renewable Drop-in fuel
Coking
Lemna
Advanced Biofuel
120,000 gpy demo is open; 70 Mgy by 2012 (first commercial scale facility - estimated timeline)

Phycal
Central Oahu, Hawaii, USA
Bio-oil

Algal oil extraction
Algae
Advanced Biofuel
When the pilot farm is fully operational by 2011, Phycal expects to produce 100,000 gallons of algal biocrude oil per year.

POET
Emmetsburg, Iowa, USA
Ethanol
Enzymatic hydrolysis
Corn stover, switchgrass, MSW, wheat straw
Cellulosic biofuel
25 Mgy Project Liberty (Emmetsburg, IA), no announced month. Company's 2022 goals: 1 billion gallons through added capacity at POET's existing network of 26 corn ethanol plants. 1.4 billion gallons through licensing of the POET technology to other existing corn ethanol producers. 1.1 billion gallons based on new feedstocks sourced through POET Biomass and through joint ventures, using wheat straw, switchgrass and municipal waste as feedstocks.

Pond Biofuels
Thames River, Ontario, Canada
Biodiesel
Algae burning/transesterifcation
Algae
Biomass-based diesel
The St. Marys Cement plant has introduced a CO2 pipeline from its main facility to a $4 million algae-growing demonstration facility operated by Pond Biofuels, which absorbs the CO2 using a strain of algae from the nearby Thames River

Powers Energy
Lake County, Indiana, USA
Ethanol
MSW
Cellulosic biofuel
Powers Energy is waiting for permission from the state's Department of Environmental Management to begin work on its planned $254 million MSW-to-ethanol facility in Lake County.

Praj MATRIX
Pune, India
Ethanol
Enzymatic hydrolysis
Cellulose
Cellulosic biofuel

Queensland Algal project
U of Q, Queensland, Australia
Renewable oils
Algal oil extraction
Algae
Advanced Biofuel
10,000 gallons (Digest est.) QUT's Mackay Renewable Biocommodities Pilot Plant (MRBPP), situated at Mackay Sugar Limited's Racecourse Mill site, is near completion and the $8.2M facility will be available for access from July 2010. In addition to sugarcane bagasse and trash which is readily available from the sugar factory, the MRBPP will be capable of processing other biomass feedstocks sourced from partners throughout Australia to produce bioethanol and high value biocommodities at semi-industrial scale.

Queensland University of Technology
Mackay, Queensland
Australia
Ethanol
Bagasse
Cellulosic biofuel
KBR (NYSE: KBR) announced that it has been chosen to provide engineering services for a pilot algal biofuels plant in Queensland,

Range Fuels
Soperton, Georgia, USA
Methanol/then ethanol
Gasification
Wood waste
Cellulosic biofuel
Commenced producing 4 Mgy of biomethanol in Q3 2010; introducing ethanol production by Q4 2010.

REII
Sacramento, California, USA
Renewable Drop-in fuel
Gasification
Cellulosic biofuel
DOE $25M grant 2009 for 25 ton/day cellulosic demo; test sites at Toledo, Sacramento as of 1/2010 "for 2 years"

Rentech
Rialto, California, USA
Renewable Drop-in fuel
Fischer-Tropsch

Advanced Biofuel
150,000 gpy pilot is open; 8 Mgy Rialto project timeline projects 2013 opening; 2014 estimated opening for Natchez MS project 250 Mgy

Sapphire Energy
Columbus, New Mexico, USA
Renewable Drop-in fuel
Hydroprocessing
Algae
Advanced Biofuel
NM pilot (estimated production from 20 acres)

Scottish Bioenergy
Glenturret, Perthshire, Scotland
Ethanol
Enzymatic hydrolysis
Algae
Cellulosic biofuel
Capacity estimated - at Glenturret distillery in Perthshire - Shell, Edrington Group and SETN are partners.

Seambiotic
Ashkelon, Israel
Biodiesel
Algae transesterification
Algae
Advanced Biofuel
Ashkelon pilot plant, Israel

SEKAB
Sweden
Ethanol
Enzymatic hydrolysis
Straw
Cellulosic biofuel
Sweden pilot operating since 2004

Solazyme
South San Francisco, California, USA
Renewable oils
Hydroprocessing
Algae
Advanced Biofuel
150,000 is 2011 estimate based on Navy contracts announced; 100 Mgy is published

2012/13 target

Solix
Durango, Colorado, USA
Biodiesel
Algae transesterification
Algae
Advanced Biofuel
6,000 gpy open (rounded to 10,000 gallons)- no timelines on commercial scale announced

St1 Biofuels Oy
Hameelinna, Finland
Ethanol
Enzymatic hydrolysis
Cellulosic biofuel
First bionolixtm plant in Hämeenlinna, Finland by 2011 - capacity is estimated.

Terrabon
Bryan, TX, USA
Biogasoline
Fermentation/Chemprocessing
MSW
Advanced biofuel
100,000 gpy demonstration plant operational in 2010 - first commercial facility scheduled for 2012 Q4

Thermochem Recovery (TRI)
Durham, North Carolina, USA
Ethanol
BTL - syngas
Cellulosic biofuel
Thermochem Recovery International (TRI) announced in April 2010 that it had recently surpassed 1,000 hours of integrated operation of its state-of-the-art biomass-to-liquids process demonstration unit (PDU) in Durham, North Carolina.

TMO Renewables
UK
Ethanol
Enzymatic hydrolysis
Cellulsoe
Cellulosic biofuel
See Fiberight projects, using TMO technology. 10,000 gpy (est) open.

Trenton Fuel Works

Trenton, New Jersey, USA
Ethanol
Acid hydrolysis
Mixed cellulose
Cellulosic biofuel
In New Jersey, Trenton Fuel Works announced details of its proposed 3.87 Mgy biomass-to-fuel pilot project in Trenton, converting food, paper and yard waste Trenton Fuel Works at a facility that will cost $2 million to acquire and $65 million to retrofit and commence operations.

UK Carbon Trust Algae consortium
UK
Renewable oils
Algal oil extraction
Algae
Advanced Biofuel
Three-year project. Goal is $3.78 fuel. Participating are University of Coventry, London Queen Mary. University of Manchester, University of Newcastle, Critical Processes, Plymouth Marine Laboratory, Scottish Association for Marine Science, University of Sheffield, University of Southampton, University of Swansea and Bangor University.

UK Carbon Trust pyrolysis consortium
UK
Bio-oil
Pyrolysis
Mixed cellulose
Cellulosic biofuel
A consortium including Axion Energy, Catal International, CARE and Aquafuels Research has landed $10.5 million in UK government grant support via the Carbon Trust for the development of pyrolysis technology. The consortium's goal is the development of micro-refineries co-located at landfill sites and other waste sites by 2020. The group's first pilot plant will be operational by 2014 with a cost goal of $1.70-$2.70 per gallon (GBP 0.30-0.48 per liter).

UOP-Aquaflow Bionomic
Hopewell, Virginia, USA
Renewable Drop-in fuel
Algae oil hydrotreating
Algae
Advanced Biofuel
The project, managed by the DOE's National Energy Technology Laboratory, will capture CO2 from the exhaust stacks of the Hopewell caprolactam facility and deliver it in a controlled and efficient process to a pond near the plant, where algae will be grown using automated control systems from Honeywell Process Solutions and technology developed by

New Zealand's Aquaflow Bionomic. The project will also support the independent evaluation of the use of RTP rapid thermal processing technology from Envergent Technologies, a joint venture between UOP and Ensyn Corp.

UPM-Kymmene/Metso
Finland
Ethanol
Enzymatic hydrolysis
Mixed cellulose
Cellulosic biofuel
Biooil from wood waste - Fortum joining project - 112 Mgy capacity at commercial scale

US Biofuels
California. USA
Advanced Biofuel
4.7 mgy production facilities will be completed no later than 12/2010; three locations in California

Virent Energy Systems
Wisconsin, USA
Renewable Drop-in fuel
Bioforming
Mixed cellulose
Cellulosic biofuel
Virent and Shell announced the successful startup of the Virent “Eagle” demonstration plant in April 2010, producing 10,000 gallons per year of biogasoline, a drop-in renewable fuel. The companies said engineering will commence in 2011 for a 100 Mgy commercial scale plant.

Weyland / Statoil Hydro
Bergen, Norway
Ethanol
Enzymatic hydrolysis
Mixed cellulose
Cellulosic biofuel
Weyland plant - Ethanol pilot acid hydrolysis outside Bergen, Norway. Woody biomasss feedstock. Cooperation between Weyland and SH

Woodland Biofuels
Sarnia, Ontario, Canada
Ethanol
Enzymatic hydrolysis
Wood waste
Cellulosic biofuel

Woodland Biofuels pilot cellulosic ethanol plant in Sarnia, Ontario. The report says that the project is scheduled to be completed by mid-2011 and will produce less than 1 Mgy

Zeachem
Boardman. Oregon
USA
Ethanol
Gasification/fermentation
Poplar/energy woods
Cellulosic biofuel
250,000 open Dec 2010; ready for commercial thereafter, no announced projects or timelines

2010-11 CANDIDATE COMPANY PROFILES

Starting with the 2009-10 Hot 50 in rank order, then the other competing companies in alphabetical order.

#1 Solazyme

Company description: Solazyme is an industrial biotechnology company harnessing the power of microalgae to produce renewable oils and bioproducts.

Address:
Solazyme, Inc.
225 Gateway Blvd.
South San Francisco, California 94080

Year Founded: 2003

Chief Executive Officer and contact email: Jonathan Wolfson CEO; Harrison Dillon, President

Annual Revenues: N/A

Major Investors:
Solazyme's major investors include Unilever, Bunge, Sir Richard Branson, San-Ei Gen, Braemar Energy Ventures, Harris & Harris Group, Lightspeed Venture Partners, The Roda Group, VantagePoint Venture Partners, Zygote Ventures, and CTTV Investments LLC, the venture capital arm of Chevron Technology Ventures LLC.

Type of Technoloies):
Solazyme's unique renewable oil production process uses microalgae to convert biomass directly into oil and other biomaterials, a process that takes a matter of days and can be performed in standard commercial fermentation facilities cleanly, quickly, and at low cost and large scale. Our renewable oil and bioproducts technology has manufactured tens of thousands of gallons of oil - in fact in 2010 alone we will produce approximately 100,000 gallons of oil. Solazyme's latest technology breakthrough on tailoring the oil by carbon chain length and saturation offers a distinct advantage to its partners in the fuels and chemicals industry. The oils that Solazyme produces can act as replacements for fossil petroleum and plant oils and compounds in a diverse range of products from renewable chemicals to cosmetics and food ingredients.

Feedstocks: Solazyme's technology is extremely feedstock flexible and utilizes a wide variety of biomass. We have proven our process using cellulosic feedstocks and energy crops such as miscanthus, switch grass, municipal grass clippings, corn stover, wood chips, sugar cane bagasse, and sugarcane.

Fuel Type (if applicable):
100% algae derived renewable Solajet®HRJ-5; jet fuel.
100% algae derived renewable SoladieselRD™; diesel fuel
100% algal derived Soladiesel®HRF-76 Renewable Naval Distillate fuel; ship fuel

What is important to note about Solazyme's fuels is that they are a 100% drop-in replacements to traditional fuels. They operate without a blend wall, making them chemically indistinguishable from regular diesell and operable with or without the use of traditional fuels when placed within an engine. Additionally, no engine, pipeline, or refining modifications need to be done to the current infrastructure that Solazyme operates within today.

Fuel Cost (if applicable - per US gallon): *(If you do not manufacture or have long-term stable feedstock pricing, please use the latest December futures contract pricing for traded feedstocks, or $55/ton for untraded biomass – or provide notes on your own feedstock pricing assumptions).*

Our target is $60 - $80 per barrel oil production and we are at productivity levels that demonstrate near the upper end of that range currently and are continuing to drive costs down. Fuel costs for the individual consumer are difficult to say exactly, because of tax credits, taxes and refining and distribution costs, but it should certainly be in the range of where fuels are selling today in CA.

Offtake partners (if applicable):
We have not publically announced offtake agreements, but we have announced partners and also strategic investors in key market areas such as Unilever, Chevron, the DoD, Ecopetrol, and Bunge.

Co-products (if applicable):
Renewable chemicals
Food oils and flour derived from algae.
Personal care products including a skin care line and soaps.
Animal feed

3 Top Milestones for 2009-10:

- Completed world's largest microbial advanced biofuel delivery to U.S. Military. Solazyme delivered 20,000 gallons of algal-derived shipboard fuel and 1500 gallons of 100% algal derived jet fuel to the U.S. Navy and signed a new contract with the U.S. Department of Defense for a research and development project that will produce 150,000 additional gallons in 2010-2011, 7.5 times larger than the previous order. Also announced a nearly $22 million grant from the DOE for an integrated biorefinery.
- Announced a strategic partnership with Unilever to bring renewable algal oil to personal care products, a natural replacement to palm oil. This agreement followed the culmination of a yearlong collaboration between Solazyme and Unilever, in which Solazyme's renewable algal oils were tested successfully in Unilever product formulations. Also announced a strategic partnership with Ecopetrol Colombia's

largest energy company.

- Announced Series D Financing Round of more than $60 Million, and included announcement of key strategic investors Unilever, Bunge and Sir Richard Branson.

3 Major Milestone Goals for 2011-13:

- Deliver on the 150,000 gallon fuels contract for the US Navy
- Further solidify Solazyme's position as world's first and only provider of tailored, designer oils
- Expand commercial footprint of Solazyme's renewable oil technology in Health Sciences and Nutritionals markets.

Business Model:
Solazyme's mission and business model is straightforward, we are a biotechnology company focused on producing tailored oils and bioproducts. Founded originally as an algal biotechnology company intent on producing diesel fuel, Solazyme renewable oil platform technology is now creating tailored oils that will have impact in multiple large market areas including fuels and chemicals, foods and cosmetics. The ability to tailor designer oils for specific applications means that Solazyme can now make the perfect oil for diesel, the perfect oil for jet fuel and tailored oils for the chemical industries as well. Solazyme has been focused on scaling the technology and driving down the cost of production, in fact this year alone Solazyme will make 100,000 gallons of oil. Solazyme's strategy is to partner with some of the world's largest companies to bring this technology to commercialization in thefour key market areas.

Another key component of Solazyme's business model is that its renewable oil production technology has been designed to fit into existing infrastructure at every step of the process, from industrial fermentation, to downstream processing, to refining. In addition the platform is extremely feedstock flexible so it is not limited to a certain geographic area. Solazyme also produced 100% cellulosic diesel this year and successfully road tested it, the feedstocks used to produce the fuel included switch grass, corn stover, sugar cane begasse, miscanthus, and municipal waste grass clippings.

Competitive Edge(s):
Solazyme's technology represents the first viable bridge from sugars to oil. It is the first company in the world to convert biomass to oil producing a direct substitute for oils used today including petroleum & plant-based oils, and new better performing oils that have never previously existed. Solazyme's unprecedented ability to now tailor the carbon chain lengths and saturation levels of the oils opens new links in the value chain proposition and their savvy announced partnerships are a testament to the potential of this technology in addressing multiple markets.

Solazyme has made in specification fuels for the military which met the stringent requirements for both shipboard diesel and Navy jet fuel. In addition Solajet®HRJ-5 jet fuel has passed all of the eleven essential tested specifications required to meet the ASTM

D1655 (Jet-A1) standard. It is the world's first microbially-derived jet fuel to do so. In addition, Solazyme has delivered the largest amount of advanced biofuels ever produced to the US Navy this year and has signed a significantly larger contract to deliver 150,000 gallons more next year.

Solazyme has delivered more oil and fuel to its partners/customers than the rest of its competitors combined. Its ability to scale production is unparalleled to anyone else in the industry. Additionally, Solazyme's fuels operate without a blend wall, making them a 100% drop-in replacement, No other competitor has achieved this milestone.

Distribution, Research, Marketing or Production Partnerships or Alliances:
Chevron
Bunge
Unilever
Ecopetrol
San-ei-gen

Stage: (Bench, pilot, demonstration, commercial):
We are already commercially producing cosmetic materials, nutraceuticals and pre-commercial quantities of fuels today. We are working to have a fuels and/or chemicals production plant operational in the 2012 - 2013 timeframe.

We have manufactured over 80,000 gallons of oil so far in 2010 alone and will have produced over 100,000 gallons by the end of the year.

These are pre-commercial quantities for fuels and chemicals (commercial quantities for foods, and cosmetics) and the quantities are only limited by what we have contracts to provide. Just using the existing facilities we have access to, we could produce substantially more without adding any equipment

Website URL: http://solazyme.com/

2. POET

Based in: South Dakota
Business: Largest private first generation ethanol producer; developer of cellulosic ethanol technology (using corn cobs as a feedstock).

Model:
Owner-operator, holding minority stakes in most of its plants, with local investors.

Past milestones:

1. Opening of the company's pilot cellulosic plant in Scotland, SD, producing cellulosic ethanol at a rate of approximately 20,000 gallons per year.

2.POET commenced construction of a new 22-acre biomass storage facility that will house up to 23,000 tons of biomass bales. The facility will form part of the 25 Mgy Project LIBERTY complex, which is now scheduled to commence construction in early 2012, pending the outcome of a loan guarantee application from the DOE.

2. Completed its first corn cob collection season, and in a 16-day trial of new cob harvesting tecnology.

3. Announced the creation of POET Biomass, a division of POET devoted to managing harvest and transportation logistics for corn cobs – POET's cellulosic feedstock – as well as waste wood and other feedstocks to be used for cellulosic ethanol and alternative energy projects at their production facilities.

4. The POET Biorefining plant in Bingham Lake has deployed a new technology for eliminating water discharge, and the 35 Mgy corn ethanol plant is now using 2.64 gallons of water per gallon of ethanol produced, down from 3.42, with water discharges limited to steam and the water content in dried distillers grains and other byproducts. POET has been working on recycled water use, capturing 100 percent of its water used at its Portland, Indiana plant from recycled quarry water and 80 percent of its water at the Big Stone, SD plant from a power plant cooling pond.

5. With the city of Sioux Falls, completed a landfill gas pipeline that will supply methane gas to the 105 Mgy POET plant at Chancellor. The 10-mile, low-pressure pipeline from the Sioux Falls Regional Sanitary Landfill will provide the landfill gas used a wood waste-fuel boiler to generate process steam. The two alternative energy sources will offset up to 90 percent of the plant's process steam needs and could in the future replace 90 percent of the plant's total energy needs. The partnership will provide revenues to Sioux Falls and reduce costs at the POET Chancellor plant. The project is the 460th around the country to utilize landfill methane. The pipeline cost the city $4.3 million, costs $300,000 to operate, and

will generate $1.8 million in annual city revenue from sale of methane to POET.

6. POET received the 2008 Biofuels Digest Achievement Award for Cellulosic Ethanol. The award was given in recognition of achieving high yields and reduced energy inputs in ethanol production through its BPX technology.

7. Awarded the Energy Star designation for energy efficiency at its Ashton, IA plant. The 56 Mgy POET corn ethanol plant in Ashton, which opened in 2005, is equipped with combined heat and power (CHP) that generates up to 7.2 MW of electricity and requires 16 percent less fuel than a conventional process. The process saves 18,900 tons of $CO2$ emissions per year.

Future milestones:

1. The company said that it expects to harvest up to 25,000 acres for cobs in Texas, South Dakota and Iowa in fall 2009.

2. 25 Mgy Project LIBERTY cellulosic ethanol plant in Emmetsburg, Iowa opens in 2011.

Metrics:
Can produce up to 3.0 gallons of ethanol per bushel of corn with its proprietary BPX technology. BPX also reduces energy needs for fermentation by 8 to 15 percent compared to other ethanol production processes.

Targeting payments to farmers of $30 to $60 per ton for corn stover (cobs and stalk), and said that farmers could increase these payments through the Biomass Crop Assistance Program. An Iowa farm averages 1.5 tons of corn stover per acre, or $45-$90 per acre in value before BCAP payments are considered.

3. Amyris Biotechnologies

Company description: Amyris is building an integrated renewable products company by applying our industrial synthetic biology platform to provide alternatives to select petroleum-sourced products used in specialty chemical and transportation fuel markets worldwide. We genetically modify microorganisms, primarily yeast, and use them as living factories in established fermentation processes to convert plant-sourced sugars into potentially thousands of target molecules. Our first commercialization efforts have been focused on a molecule called farnesene, which forms the basis for a wide range of products varying from specialty chemical applications such as detergents, cosmetics, perfumes and industrial lubricants, to transportation fuels such as diesel.

Address: 5885 Hollis St., Ste. 100, Emeryville, CA 94608

Year Founded: 2003

Chief Executive Officer: John Melo

Annual Revenues: $26.4 million through Q2 2010

Major Investors: Amyris is a privately-held company whose investors include Kleiner Perkins Caufield & Byers, Khosla Ventures, TPG Biotechnology, Votorantim Novos Negocios, Advanced Equities Inc., DAG Ventures, Grupo Cornélio Brennand, Naxos Capital Partners, The Westly Group, Stratus Group, and Temasek Holdings.

Type of Technolog(ies): We have developed genetic engineering and screening technologies that enable us to modify the way microorganisms, or microbes, process sugar. By controlling these metabolic pathways, we design microbes to serve as living factories, or biorefineries, to produce target molecules that we seek to commercialize. Our platform utilizes proprietary high-throughput processes to create and test as many as 1,000 yeast strains a day in order to select those yeast strains which are most efficient. We first developed and applied our technology to create microbial strains to produce artemisinic acid, a precursor of artemisinin, an anti-malarial therapeutic. This work was funded by a five year grant awarded by the Bill & Melinda Gates Foundation to the Institute for OneWorld Health. We have granted a royalty-free license to this technology to sanofi-aventis for the commercialization of artemisinin-based drugs.

Feedstock: We can use a range of feedstock, with initial focus on sugarcane and sweet sorghum.

Fuel Type: Renewable jet and diesel, renewable chemicals

Fuel Cost (if applicable - per US gallon): *N/a*

Offtake partners: Shell, The Procter & Gamble Company (P&G), and M&G Finanziaria (M&G)

3 Top Milestones for 2009-10: Established joint venture for first commercial plant with Grupo São Martinho; Established strategic alliance with Total; Brought demonstration facility into operations.

3 Major Milestone Goals for 2011-13: Activate first commercial sales, start-up first commercial plant.

Business Model: Work in partnership with producers, sharing margin to incentive them to produce our products, and market and distribute directly to industrial customers.

Competitive Edge(s): Broad, scaleable technology

Distribution, Research, Marketing or Production Partnerships or Alliances: Total, Grupo São Martinho, Cosan, Bunge Limited, Givaudan

Stage: On verge of commercialization

Website URL: www.amyris.com

4. BP Biofuels

BP Biofuels is a leading global biofuels player, with a breadth of investment that is unique in terms of both its scale and its reach. Producing ethanol today, BP Biofuels has investments throughout the entire biofuels value chain: from sustainable feedstocks, including cellulosic energy grasses, through to advantaged molecules like biobutanol. BP's close links into other sectors that will be crucial to the development of the biofuel industry, particularly the automotive industry, and its in-depth knowledge of the fuels market and infrastructure, will underpin the biofuels industry's intentions to grow to be a more material and sustainable part of the global transport fuel market.

Since 2006, BP has announced investments of more than $1.5 billion in biofuels research, development and operations, and has production facilities operating or in the planning/construction phases in the US, Brazil and Europe.

Our joint venture Tropical Bioenergia is producing ethanol from sugar cane in Brazil and represents the largest investment by any international oil company into the Brazilian ethanol industry to date. Vercipia Biofuels, our joint venture with Verenium, is progressing the development of one of the US's first commercial-scale cellulosic ethanol facilities, which will produce 36 million gallons of ethanol per year from energy grasses. In partnership with DuPont, BP is developing the advanced biofuel biobutanol and constructing a technology demonstration facility in the UK. Also in the UK, in partnership with British Sugar and DuPont, BP is constructing a 110 million gallon per year wheat-to-ethanol facility. In addition, BP has invested $500 million over 10 years in the Energy Bioscience Institute (EBI), at which biotechnologists are investigating applications of biotechnology to energy.

BP is one of the world's largest energy companies, providing its customers with fuel for transportation, energy for heat and light, retail services and petrochemicals products for everyday items. It is the largest oil and gas producer in the US and one of the largest refiners. BP also has a global network of around 22,000 service stations. BP blended and distributed more than 1 billion gallons of ethanol in 2008.

Based in:
BP Biofuels UK Ltd
County Hall
Belvedere Road
London
SE1 7BF

Year Founded:
BP Biofuels was set up in 2006.
BP p.l.c. celebrates its centenary in 2009.

Annual Revenues:
BP does not disclose the revenues of individual operating businesses. All our Alternative Energy results are reported as part of Other Business and Corporate in the group's results.

Technology:
The BP Biofuels strategy focuses on the fermentation of sugars to produce ethanol, biobutanol and biodiesel.

Fuel type:
BP has a number of strategic biofuel investments:

- BP is producing ethanol from sugar cane in Brazil in a joint venture with Maeda and Santelisa Vale, called Tropical Bioenergia. The JV will invest approximately $1 billion in two refineries, each of which will have a capacity of 115 million gallons.
- In partnership with DuPont, BP is developing the advanced fuel molecule biobutanol, which has a higher energy content that ethanol, can be blended at higher rates into fuel that can be used by vehicles on the road today and may be able to facilitate the adoption of biofuels into the fuel supply chain at a faster rate. The partners are constructing a technology demonstration facility in the UK.
- With British Sugar and DuPont, through a joint venture called Vivergo Fuels, BP is constructing a 110 million gallon-per-year wheat to ethanol plant in the UK. When operating next year, it will produce one-third of the UK's requirement for ethanol under the UK's renewable transport fuel obligation (RTFO). Once the technology has been proven at scale, the partners will look to convert the plant to produce biobutanol.
- In partnership with Verenium, BP is working to develop and commercialize advanced lignocellulosic biofuels, from energy grass feedstocks. The joint venture, Vercipia Biofuels, will be constructing one of the first cellulosic ethanol facilities in the US, based in Highlands County Florida. When operating in 2012, the plant is expected to produce around 36 million gallons per year.
- In August 2009, BP announced a joint development agreement with Martek Biosciences Corporation to advance technology for the conversion of sugars into biodiesel. BP has invested $10 million investment. The technology will convert sugars derived from biomass feedstocks (such as sugar cane or dedicated energy grasses) into diesel fuel molecules.
- BP has committed $500 million over 10 years into the Energy Biosciences Institute – working with the University of California Berkeley and its partners, the University of Illinois, Urbana Champaign and the Lawrence Berkeley National Laboratory. The institute is exploring ways in which biosciences can be applied to produce new, cleaner energy fuels, including advanced biofuels.
- BP is working with Mendel Biotechnology to develop a range of new energy grass feedstocks that can be used to produce the next generation of advanced cellulosic biofuels.

Major investors:

BP is a public company, of which BP Biofuels is a wholly-owned subsidiary.

Past milestones:

- Production of bioethanol from sugar cane:
    - First production at Tropical Bioenergia, Brazil, in September 2008

- Development of lignocellulosic biofuels:
    - Technology partnership with Verenium formed in August 2008 to develop and commercialise cellulosic bioethanol technology based off energy grasses such as energy cane and miscanthus.
    - February 2009: joint venture with Verenium created (Vercipia Biofuels) and plans to construct a 36 million gallon per year commercial-scale cellulosic bioethanol plant in Highlands County, Florida, announced.

- Sugar-to-diesel technology:
    - Joint development agreement (JDA) between BP and Martek Biosciences Corporation announced August 2009. JDA will establish proof of concept for large-scale, cost effective microbial biodiesel production through fermentation, from biomass feedstocks.

Future milestones:

With our JV partners:

- Advance the demonstration of biobutanol technology:
    - Complete construction and begin production at a biobutanol technology demonstration plant in the UK (with our partners, DuPont).

- Begin construction of one of the US's first cellulosic ethanol facilities, in Highlands County, Florida (with our partners Verenium Corporation).

- Progress development of sugar-to-diesel technologies in partnership with Martek Biosciences Corporation.

Business model:

- BP operates primarily through joint venture and joint development partnerships with other organizations that have expertise in the technologies and markets required to ensure success. BP brings scale, infrastructure and fuels market knowledge to these partnerships to drive long-term development of the businesses.

Fuel cost:

- Varies for each of our technologies. We aim to bring biofuel costs down to a level at which they are competitive with conventional fuels without subsidy.

Competitive edge:

BP's contribution to the biofuels industry is significant and growing. For our own biofuel operations, our differentiators are:

- Global scale and reach, and an intent to develop projects that can succeed on a global platform and make a material difference to supplies of sustainably-produced biofuels.
- Breadth of strategy – covering the entire biofuels value chain, from a range of sustainable feedstocks appropriate to different markets, through to the production of advantaged molecules to meet varied consumer needs: ethanol, biobutanol and biodiesel.
- As one of the world's largest energy companies and a major blender, distributor and retailer of transport fuels, BP has core expertise and capabilities in fuel infrastructure, fuel markets and the requirements of the vehicle parc. This experience will be crucial in scaling-up the biofuels supply chain to meet the needs of consumers.
- Sustainability has been central to the strategic decisions that BP has made about its biofuels business: the feedstocks to invest in, the geographies to focus on and the molecules to pursue. We are developing ways to ensure and report on sustainability throughout our supply chain – including the development of an effective sustainability management system for our biofuels operations and we are members of the Roundtable for Sustainable Biofuels, the Better Sugarcane Initiative, Roundtable for Sustainable Palm Oil and Roundtable for Responsible Soy.

Alliances and Partnerships:
Major joint venture / joint development partners in the biofuels area are:

- DuPont
- British Sugar
- Verenium Corporation
- Mendel Biotechnology
- Martek Biosciences Corporation
- Santelisa Vale
- Maeda Group
- The Energy Biosciences Institute

Development stage

- Commercial production of bioethanol from sugar cane in Brazil.
- Commercial production of bioethanol from wheat under construction in the UK.
- Demonstration scale LC ethanol (through our partners, Verenium) and planned construction of commercial-scale facility in Florida.
- Biobutanol technology demonstration facility under construction in the UK.

Vercipia

BP's subsidiary Vercipia currently operates an integrated cellulosic ethanol pilot facility in Jennings, Louisiana. This plant is used to broaden the company's capabilities in advanced fermentation and to test a range of feedstocks for conversion into cellulosic ethanol. The pilot plant also serves as a real-time research and development facility to develop new enzyme cocktails for optimizing the production of cellulosic ethanol. Additionally, Vercipia has fully commissioned its 1.4 MGY demonstration-scale facility, also located at its Jennings site, representing the first of its kind in the nation. Verenium's process technology has also been licensed to Tokyo-based Marubeni Corporation and Tsukishima Kikai Co., Ltd. and incorporated into their 1.4 million liter-per-year cellulosic ethanol plant in Osaka, Japan – utilizing construction and demolition wood waste as a feedstock.

Vercipia Biofuels intends to break ground on one of the nation's first commercial-scale cellulosic ethanol facilities in Highlands County, Florida, in 2010. This 36 MGY facility is expected to begin commercial production in 2012. Vercipia anticipates developing additional commercial facilities in the Gulf Coast region and expects to announce the location of its second plant in the coming year.

Website URL
www.bp.com/biofuels

5. Sapphire Energy

Company description:
Sapphire Energy is building a scalable replacement for crude oil from Co_2, sunlight, and algae. Their scientific discovery and technology development resides at the intersection of biotechnology, agriculture and energy. Sapphire leverages the experience of the world's most scalable industries, energy and agriculture, to make crude oil replacements and drop-in-fuels, gasoline, diesel, and jet. This approach results in their capability to cultivate algae at world scale to generate millions of barrels of green crude, reducing our nation's dependence on fossil oil, and leading the world in the technology revolution for new renewable sources of energy production.

Address:
3115 Merryfield Row, San Diego, CA 92121

Year Founded:
2007

Chief Executive Officer and contact email:
Jason Pyle, MD, PhD / Chief Executive Officer

Annual Revenues:

Major Investors

Sapphire Energy is supported by a world-class syndicate of investors led by co-founder ARCH Venture Partners, along with The Wellcome Trust; Cascade Investment, LLC and Venrock.

Type of Technology (ies):

Green crude production. Sapphire is focused on building technology along the entire value chain from biotechnology, cultivation, harvest, and oil extraction to commercialize large scale algae production in low cost open cultivation systems modeled after production agriculture.

Feedstocks: Algae, CO_2

Fuel Type:
Renewable, drop-in replacements for gasoline, diesel, and jet fuel.

Fuel Cost:
Sapphire believes at commercial scale (5,000 – 10,000 barrels/day) they will provide green crude at $60 to $85 a barrel, which is competitive today with the cost of a marginal barrel of crude oil from new sources found in ultra deepwater, or from tar and shale.

Co-products:
The chemicals and nutrients contained in the algae biomass are recycled back into Sapphire's algae production systems to significantly reduce the need to add (N) nitrogen, (P) phosphorus, and (K) potassium. This novel process reduces the GHG lifecycle impacts, significantly reduces the cost of production, and leads to a process which is scalable to meet the nation's significant demands for energy production. These same chemicals and nutrients would be needed in most co-products processes and leads Sapphire to focus on energy production almost exclusively.

3 Top Milestones for 2009-10:

1) Sapphire Energy was awarded $104.5MM in a combination of USDOE grants and USDA loan guarantee for commercial demonstration.
2) Sapphire Energy participated in the world's first commercial airliner flight (Boeing 737-800) using algae-derived jet fuel blend.
3) Construction completed and operations underway for the world's most extensive and sophisticated algae research and development facility in Las Cruces, NM. Sapphire Energy has a 1,000,000 Liter comprehensive pond system, end-to-end (biology, cultivation to oil) pilot system with over 50,000 hours of continuous operation.

3 Major Milestone Goals for 2011-13:

1) Complete construction of initial phase and begin operation of the Integrated Algal Biorefinery (IABR) in Columbus, N.M.
2) Continue to achieve scientific milestones to develop our technology platform and evolve algae into a production agriculture technology
3) Develop strategic partnerships to enable our technology developments to be commercialized

Business Model:
Owner-Operator.

Competitive Edge(s): Sapphire Energy believes its energy, agriculture and biotechnology strategy, financial position, 248 patents issued and pending, and USG partnership gives the company a significant advantage. The development of an energy specific crop which uses only, sunlight, non-potable water, non-arable land, and CO2 to produce a cost competitive crude oil that can be refined into diesel and jet fuel gives Sapphire a considerable edge in the industry. Sapphire's approach is enabled through a world-class biotechnology platform to create a scalable drop-in-replacement low carbon energy crop from algae.

Distribution, Research, Marketing or Production Partnerships or Alliances: As part of the American Recovery and Reinvestment Act and through the biorefinery assistance program in the 2008 Farm Bill, Sapphire has partnered with both the USDOE and the

USDA to build a $135 million Integrated Algal Biorefinery. The USDOE/USDA partnership represents the largest 3rd generation fuel commercial demonstration projects to date. In addition to this partnership, Sapphire also collaborates with a number of leading scientists and universities from the Department of Energy's Joint Genome Institute; Sandia National Laboratory; University of California, San Diego; The Scripps Research Institute; University of Tulsa; New Mexico State University; and San Diego Center for Algal Biotechnology.

Stage:
Sapphire Energy has a fully developed biotechnology platform, a 1 million liter research and development facility with over 50,000 hours of continuous pilot data, and a commercial demonstration facility breaking ground at the end of 2010.

Website URL: http://www.sapphireenergy.com

6. Coskata

Company description:

Coskata is a biology-based renewable energy company whose low-cost platform technology allows for the production of fuels and chemicals from a wide variety of input materials, including biomass, agricultural and municipal wastes, and other carbonaceous material, at a low cost.

Using proprietary microorganisms and patented bioreactor designs, Coskata is ready today to produce FlexEthanol™, or feedstock flexible ethanol, to reduce the United States' dependence on foreign oil in an economically and environmentally beneficial way.

Address:

4575 Weaver Parkway, Suite 100
Warrenville, Illinois 60555

Year Founded:

2006

Chief Executive Officer:

William Roe

Annual Revenues:

N/A

Major Investors:

TOTAL (NYSE:TOT), General Motors, Blackstone Cleantech Venture Partners, Khosla Ventures, Advanced Technology Ventures, Globespan Capital Partners, Great Point Ventures, Coghill, Triple Point Capital, Sumitomo and Arancia Industrial.

Type of Technology(ies):

Coskata's affordable, flexible and efficient process allows for one of the lowest production costs in the industry and one of the highest ethanol yields per ton of biomass. Our technology employs a three step process: gasification, biofermentation, and separation. During gasification, the feedstock is thermally broken down to form synthesis gas (syngas). During the second step, fermentation, the syngas is sent to a proprietary bioreactor where patented microorganisms consume the gas and produce ethanol. The last step of the Coskata process uses conventional distillation and dehydration technology to separate the ethanol from the water, resulting in pure, fuel-grade ethanol.

Feedstocks:

Coskata's highly feedstock flexible process can utilize virtually any carbonaceous feedstock, including energy crops such as: switchgrass and miscanthus; wood chips, forestry products, corn stover, bagasse and other typical agricultural wastes; municipal solid waste and industrial organic waste like petroleum coke. Our feedstock flexibility allows for enormous geographical and economic advantages over other fuel technologies.

Fuel Type (if applicable):

Cellulosic ethanol

Fuel Cost (if applicable - per US gallon):

N/A

Offtake partners (if applicable):

N/A

Co-products (if applicable):

N/A

3 Top Milestones for 2009-10:

1. In October 2009, **Coskata successfully unveiled its integrated biorefinery**, located outside Pittsburgh, in Madison, Pennsylvania. The facility is currently producing feedstock flexible ethanol and is the largest scale hybrid syngas fermentation system that has ever been demonstrated. The results from the facility are proving that Coskata can produce ethanol at one of the lowest costs in the cellulosic biofuels industry. Furthermore, it validates that our efficient and flexible process can be cost-effective with gasoline without relying on government subsidies. The unveiling of the facility led to an article on the front page of the *New York Times* Business section, titled "Industry Built From Scratch."

2. In the spring of 2010, **Coskata successfully closed a round of equity financing**, with French oil major TOTAL investing in the round and taking a seat on Coskata's Board of Directors. Also participating in the transaction were a number of Coskata's prior investors, including Blackstone Cleantech Venture Partners, Khosla Ventures, Advanced Technology Ventures (ATV), Globespan Capital Partners, and Arancia Industrial. These investments confirm the viability Coskata's technology platform.

3. Coskata has worked enthusiastically over the past couple of years to **advance the biofuels industry as a whole towards commercialization**. Coskata's thought leadership has most notably been recognized when Coskata's CEO, William Roe, presented at the *Wall Street Journal*'s ECO:nomics Conference, and when he testified in front of the U.S. House of Representatives' Committee on Agriculture. Through these opportunities and others, Coskata has sought to provide unique perspective on the state of advanced biofuels and

make headway on behalf of the entire industry.

Major Milestone Goals for 2011-13:

1. In the next few years, Coskata plans to complete construction of a full-scale, 55 million gallon cellulosic ethanol facility in the Southeast U.S.

2. The company will work to further pursue and capitalize on international opportunities, including identifying the location of a waste to fuel facility in Australia, and leveraging Coskata's relationships with foreign companies and governments to attract financing for facilities.

3. Coskata will continue to pursue and finalize licensing and co-locating partnerships domestically.

Business Model:

Coskata's business model allows it to build, own, and operate facilities around the world, as well as license the technology to leading developers, feedstock suppliers, oil companies, and existing industries. Simultaneously building facilities and licensing its technology will allow Coskata to make an impact on a large scale.

Competitive Edge(s):

Coskata's hybrid process, combining gasification and biofermentation, leads to several competitive advantages in terms of efficiency, affordability, and flexibility.

Coskata's highly efficient hybrid technology allows for one of the lowest costs of production in the industry. Our microorganisms are specific to ethanol production and our technology has the ability to extract the entire energy value of the feedstock. Finally, we are not dependent on expensive enzymes or chemicals and pre-treatment costs are significantly lower than any non-gasification based technology available today.

Second, Coskata's ethanol conversion process is one of the most feedstock flexible technologies among advanced biofuel startups and is able to create a high quality fuel from virtually any carbon-containing material. This feedstock flexibility also leads to geographic flexibility, allowing the company to build facilities virtually anywhere around the world where feedstock is available.

Finally, Coskata is one of the few companies that have successfully scaled our technology, as demonstrated at our integrated biorefinery facility in Pennsylvania. The facility has proven that Coskata can produce ethanol at one of the lowest costs in the industry, and be cost-competitive with gasoline without long-term government subsidies.

Distribution, Research, Marketing or Production Partnerships or Alliances:

Coskata's facility in Madison, PA utilizes AlterNRG's plasma gasifier.

Coskata is a member of the Renewable Fuels Association, the Advanced Biofuels

Association, and the Biotechnology Industry Organization.

Stage (Bench, pilot, demonstration, commercial):

Coskata completed its integrated biorefinery facility in 2009. We have also completed engineering and are currently in the design phase for a full scale, 55 million gallon per year wood biomass facility located in the Southeast United States.

Website URL:

www.Coskata.com

7. DuPont Danisco Cellulosic Ethanol

Based in:

500 Park Blvd, Suite 545 Itasca, IL 60143

Year Founded:

Joint Venture formed May 2008

Annual revenues:

Pre-revenue

Type of technology:

Fermentation

Fuel type:

Cellulosic ethanol

Major investors.

Formed by DuPont and Danisco

Past milestones.

- Formation of JV
- Site and funding of demonstration facility
- Start up of Vonore, TN demonstration facility by end of 2009 (250,000 gallons operated on cobs and switchgrass)

In October, Dupont Danisco Cellulosic Ethanol has filed an application for a $19.8 million grant from the Iowa Power Fund towards the construction of Project Blackhawk, their first commercial-scale cellulosic ethanol plant. The project, according to documents filed with the IPF, would be located in central Iowa, either at sites in Story County, or Webster County. The initial capacity would be between 25 Mgy and 50 Mgy, with an option to expand production to 100 Mgy at a later date.

The project would utilize corn cobs as a feedstock, and would cost up to $275 million, with up to $255 million invested by DuPont and Danisco.

Major milestone goals for 2010-11.

Site 25MGY cob plant

Site 15MGY switchgrass plant

Develop and sell beta licenses for early deployment

Business model:

Licensing

Fuel cost:

Competitive with gas at commercial scale plants (at BTU level)

Competitive edge:

* soil to tank knowledge and plan

* competitive, robust technology

* solid funding from parent companies with reach back capabilities into both parents for R&D, legal, finance etc

Alliances and Partnerships:

* $140M funding from parents

* 90 scientists from DuPont and Danisco dedicated to project

* Partnership with State of TN building Demonstration facility in Vonore, TN (State put in $40M)

* Partnership with Genera Energy, LLC in TN to supply switchgrass to demonstration plant

* Sun Grant with Iowa state on cob collection for conversion to ethanol

Development stage:

Demo

Website:

http://www.ddce.com/

8. LS9

Based in:

100 Kimball Way, San Francisco CA 94080

Year Founded:

2005

Annual Revenues: 2009: n/a 2008: n/a 2007: n/a

Technology:
A microbial, fermentation –based process that enables the cost effective conversion of renewable plant biomass into advanced biofuels that are drop-in compatible with the existing infrastructure. The same technology platform enables the production of a diversity of high-value chemicals.

Fuel type:

UltraClean™ Diesel, other UltraClean™ Fuels, and high-value chemicals

Major investors:

Flagship Ventures, Khosla Ventures, Lightspeed Venture Partners, and Chevron Technology Ventures

Past milestones:

1) Entered into a strategic partnership with Procter & Gamble to support the joint development and commercialization of LS9 technology to produce key chemicals used within the P&G portfolio of consumer chemicals

2) Secured significant equity investment from Chevron Technology Ventures

3) Announced test results confirming that LS9's UltraClean™ Diesel meets or exceeds ASTM standards for use on U.S roads and ANP specifications for use on Brazilian roads

In 2010, LS9 announced a major scientific breakthrough that will significantly lower the cost of producing "drop‑in" hydrocarbon fuels that are low‑carbon, sustainable and compatible with the existing fuel distribution infrastructure. This breakthrough has allowed LS9 to accelerate its technology and demonstrate alkane production at pilot scale.

In the article "Microbial Biosynthesis of Alkanes" published in *Science magazine*, a team of LS9 scientists announce the discovery of novel genes that, when expressed in E.coli, produce alkanes, the primary hydrocarbon components of gasoline, diesel and jet fuel. This discovery is the first description of the genes responsible for alkane biosynthesis and the first example of a single step conversion of sugar to fuel-grade alkanes by an engineered microorganism.

This summer, EPA announced this morning the winners of the Presidential Green Chemistry Challenge Awards, and LS9 and a Codexis-Merck collaboration were among the winners. LS9 is being recognized specifically for its revolutionary Renewable Petroleum technology that converts renewable raw materials into low-carbon fuels and chemicals.

Future milestones:

1) Demonstration scale production of renewable transportation fuels
2) Another strategic partnership agreement
3) Significant scale-up of high-value chemicals production

Business model:

1) Technology development
2) Production (owner/operator)

Fuel cost:

At full scale commercial production levels, LS9 estimates fuel production costs will be approximately $1.50 per gallon

Competitive edge:

- LS9 is the only 1-step process for the production of drop-in compatible advanced biofuels
- LS9's process affects a high carbon footprint reduction when compared to conventional petroleum based-production processes –in most cases yielding reductions of 85%
- LS9's 1-step technology, compared to competitors' multi-step processing technology, is highly cost competitive
- LS9's proprietary 1-step process offers 90% energetic yield
- LS9's technology platform supports cost effective production of both clean transportation fuels and renewable chemicals
- LS9's technology is feedstock agnostic – thereby, making it well positioned to quickly incorporate cellulosic-based feedstocks when those technologies come on-line

13. Distribution, research, marketing or production partnerships or alliances:

1) Strategic partnership with Procter and Gamble supporting the joint development and commercialization of LS9 technology in the production of high-value chemicals used in the production of consumer products.

2) Research and development collaborative with Lawrence Berkeley National Lab – Joint BioEnergy Institute at University of California – Berkeley.

14. **Development stage:**:

1) Pilot plant operating since August 2008

2) Rapidly scaling-up with demonstration scale production anticipated in 2010

15. Website URL: **www.ls9.com**

9. Verenium

Based in: Massachusetts

Year Founded: 2007 (merger of Celunol and Diversa)

Annual Revenues:

- FY 2007 – $46,273
- FY 2008 – $69,659
- FY 2009 – Verenium will not be providing 2009 guidance at this time.

Technology type:
Fermentation, biochemical pathways

Fuel type:
Cellulosic Ethanol, a renewable fuel source produced from natural, non-food feedstocks, such as sugarcane bagasse, dedicated energy crops and wood products. Cellulose, a long-chain polysaccharide found in nearly all plant life, is the most abundant organic compound on earth. The Environmental Protection Agency says cellulosic ethanol's high-oxygen content reduces carbon monoxide better than other oxygenates.

Major Investors:

- AWM Investment Company Inc.
- Syngenta AG
- HealthCare Ventures LLC

Past milestones:

- Verenium begins commissioning nation's first-of-its kind cellulosic ethanol demonstration plant in Jennings, Louisiana;
- Verenium announces plans to build first commercial cellulosic ethanol plant in Highlands County, Florida, with a target capacity of up to 36 million gallons per year (MGY);
- British Petroleum (BP) and Verenium form 50-50 joint venture (JV) to develop and commercialize cellulosic ethanol from nonfood feedstocks in the United States; JV now operates under the name Vercipia Biofuels

Future milestones:

- Secure financing for first commercial-scale cellulosic ethanol facility in Highlands County, Florida;
- Leverage R&D capabilities and enhance cellulosic ethanol capabilities;
- Pursue strategic partnership opportunities for the Specialty Enzyme Business Unit

Business model:

- The key elements of our corporate strategy are to develop integrated solutions for the emerging cellulosic ethanol industry for use in production facilities that we own and operate, individually or jointly with partners, as well as those of third-party licensees. We intend to use our leadership position to develop novel, high-performance enzymes and to advance our technology and process development capabilities, together with BP, at our pilot and demonstration-scale plants in Jennings, Louisiana, and our first planned commercial facility in Highlands County, Florida, to exploit opportunities in the developing market for the production of cellulosic ethanol. We have established our business model based upon the belief that owning and managing cellulosic ethanol production facilities in conjunction with strategic partners, including BP, will allow us to create economic value by incorporating our scientific and engineering skills into the production facilities. Through our joint venture with BP, we may also license our proprietary technology to extend our commercial reach and accelerate our market penetration.
- Establish a sustainable, high-growth, profitable specialty enzymes business. Our specialty enzyme products and product candidates target high-value applications where we believe our enzyme discovery and optimization technologies can deliver superior, proprietary solutions. We believe our combination of independent and partnered products is positioned to generate substantial product revenues at attractive gross profit margins. In 2008, we generated approximately $49 million in such revenues, an increase of nearly 90% over 2007. We hope to achieve increased product sales and profit margins to support the future growth and profitability of our portfolio of products sold directly by us and by our partners.

Fuel cost:

- Our goal from a cost standpoint is to be producing ethanol that is competitive with today's grain ethanol (~$2/gal).

Competitive edge:

- Verenium is the first publicly traded, fully-integrated, next-generation biofuel company, and its range of expertise and resources greatly enhances its potential for success. Verenium is mastering the entire cellulosic ethanol production process as the first and only company with the full range of "field-to-pump" capabilities. This includes: growing energy crops, developing enzymes, processing biomass into fuel and, ultimately, selling it. Additionally, Verenium's partnerships, which range from industry giants like BP and Syngenta to the U.S. Department of Energy (DOE), make the company uniquely positioned for success.

- We have a substantial intellectual property estate, including more than 250 issued patents and more than 350 patent applications, as of March 12, 2009. We believe that we can leverage our intellectual property estate to enhance and improve our technology development and commercialization efforts across both the biofuels and specialty enzymes business units, while maintaining protection of our key intellectual property assets.
- Verenium's technology enables conversion of nearly all of the sugars found in cellulosic biomass, including both five-carbon sugars and six-carbon sugars, into ethanol. This efficiency advantage, combined with low-input cost of cellulosic biomass, results in superior economics in the production of ethanol.

Distribution, research, marketing or production partnerships or alliances:

- Alfa Laval (enzyme collaboration), BASF(enzyme collaboration), BP (commercialization of cellulosic ethanol), Bunge (enzyme discovery and development), Cargill (enzyme discovery and development), Danisco (enzyme discovery and development), DOE (cellulosic ethanol fermentation technology, enzyme development for breaking down biomass), Fermic (manufacturing of enzymes), Lykes Bros. (agribusiness), Marubeni Corporation (licensee), Scion (enzyme collaboration), Syngenta (enzyme cocktail collaboration),Tsukishima Kikai Co. Ltd. (construction of Osaka plant), University of Florida (fermentation organisms).

Development stage:

Website URL:
www.verenium.com

10. Mascoma

Based in:

67 Etna Road, Suite 300, Lebanon, NH 03766

Year Founded:

2005

Technology:

Consolidated Bio-Processing (see below)

Fuel type:

Ethanol

Major investors:

Flagship Ventures, Khosla Ventures, Atlas Venture, General Catalyst Partners, Kleiner Perkins Caufield & Byers, VantagePoint Venture Partners, General Motors, Marathon Oil

Past milestones:

First demonstration of CBP technology

Opening of demonstration facility in Rome, NY

Funding from the State of Michigan for commercial ethanol production facility

Future milestones:

Breaking ground on Michigan commercial production facility

Transfer of advanced CBP technology to our demonstration plant in Rome NY

Completing next round of funding

Business model:

Owner / Partner

Fuel cost:

Mascoma Corporation is actively involved in research. Not producing ethanol commercially. According to models, the final cost of fuel continues to decrease.

Competitive edge:

The unique technology developed by Mascoma Corporation uses yeast and bacteria that are engineered to produce large quantities of the enzymes necessary to break down the cellulose and ferment the resulting sugars into ethanol. Combining these two steps (enzymatic digestion and fermentation) significantly reduces costs by eliminating the need for enzyme produced in a separate refinery. This process, called Consolidated Bioprocessing or "CBP", will ultimately enable the conversion of the solar energy contained in plants to ethanol in just a few days.

Alliances and Partnerships:

GM, Chevron, Marathon Oil, US DOE, State of NY, State of Michigan

Development stage: Demonstration

Website:

www.mascoma.com

11. Novozymes

Company description:
Novozymes is the world leader in bioinnovation. Together with customers across a broad array of industries we create tomorrow's industrial biosolutions, improving our customers' business, and the use of our planet's resources.

With over 700 products used in 130 countries, Novozymes' bioinnovations improve industrial performance and safeguard the world's resources by offering superior and sustainable solutions for tomorrow's ever-changing marketplace. In 2009, Novozymes' products globally reduced CO_2 emissions by 27 million tons.

Novozymes offers the leading technology platform for biofuel production; we are the leading enzyme provider for ethanol enzymes in all regions where we operate.

Address:
Krogshoejvej 36
2880 Bagsvaerd
Denmark

Year Founded:
2000 (Prior to 2000, a division within Novo Nordisk)

Chief Executive Officer and contact email:
Steen Riisgaard, str@novozymes.com

Annual Revenues:
1st half 2010: DKK 4,794 million (~USD 900 million)
2009: DKK 8,448 million (~USD 1.65 billion)
2008: 8,146 million DKK (~USD 1.6 billion)

Major Investors:
Novozymes A/S has two share classes: A shares and B shares. The B shares are listed on NASDAQ OMX Copenhagen under ticker code NZYM B and ID code/ISIN DK0010272129.

The A common stock is held by Novo A/S, which is wholly owned by the Novo Nordisk Foundation. In addition, Novo A/S holds 5,826,280 B shares (11%). Altogether this gives Novo A/S 25.5% of the total common stock and 70.1% of the votes.

As of June 2010, Novozymes had roughly 50,000 holders of the B shares, of which around 98% were private investors, mainly in Denmark. Institutional shareholders owned roughly 50% of the B shares. Investors outside Denmark hold approximately 59% of the B common stock.

Type of Technology:
Novozymes' core technology for the biofuels industry is enzymes that break down different types of feedstock into fermentable sugars for conversion into ethanol. Within this area, Novozymes develops solutions for two distinct types of ethanol technology: cellulosic ethanol and starch-based ethanol.

Novozymes cellulosic ethanol work is the largest endeavor the company has ever undertaken, with over 150 scientists dedicated to the effort. Not only is Novozymes' developing and offering the leading enzyme solutions for cellulosic ethanol technology, but we have also expanded our research focus into optimizing the pretreatment, hydrolysis and fermentation process steps.

In 2010 Novozymes launched the first commercially viable enzyme for the cellulosic ethanol industry, Cellic® Ctec2. The 1.8X average performance improvement over a variety of feedstocks is enabling our partners to reach a commercially viable enzyme cost window and overall production costs. We have also worked with many of our partners to help optimize their process technology in order to lower enzyme use cost and find the right balance in process tradeoffs to lower capital and operating costs.

As the world leader in bioinnovation, Novozymes produces enzymes that optimize the conversion of grains such as corn, barley, wheat and other starch raw materials into ethanol. Unrivalled in their performance and ease of use, our enzymes enable higher yields, faster throughput and lower processing costs. Our tailored solutions – including custom enzyme blends – match the specific needs of our customers' processes for liquefaction, saccharification, fermentation enhancement, and viscosity reduction.

Feedstocks: Novozymes' enzyme solutions provide robust performance on a wide variety of feedstocks. Cellulosic ethanol employs biomass feedstocks such as corn stover, wheat straw, sugarcane bagasse, woody residues, switchgrass, etc. For starch-based ethanol, the primary feedstocks are corn, barley, wheat, sugarcane, etc.

Fuel Type (if applicable):
Bioethanol

Fuel Cost (if applicable - per US gallon): *N/A*

3 Top Milestones for 2009-10:
1) In 2010, Novozymes launched Cellic CTec2, the first commercially viable enzyme for cellulosic ethanol production. A follow-up to our original Cellic CTec enzyme, CTec2 provides more than twice the performance of the original, driving the enzyme use cost down to as low as $.50 per gallon of ethanol produced.

2) Also in 2010, Novozymes launched Spirizyme® Excel, an advanced saccharification solution that makes it possible to produce more ethanol from the same amount of corn. Spirizyme Excel converts the most difficult starch fractions, allowing producers to increase yields by more than one percent. Compared to other solutions, a typical ethanol plant can gain $1 million or more per year using the enzyme.

3) 2009 – Novozymes launched Cellic CTec, our first commercially available enzyme that helped enable the transition from pilot to demo scale for our cellulosic ethanol partners

3 Major Milestone Goals for 2011-13:
1) Deliver higher-performing cellulosic enzyme solutions to help ethanol plants make cellulosic ethanol cost competitive with starch based ethanol production; working with our partners in demonstrating their cellulosic ethanol technology is commercially viable.

2) Deliver the first million gallons of commercially-viable cellulosic ethanol to the world through our enzyme development and partnership efforts.

3) Start-up of Blair, Nebraska enzyme production facility to deliver enzymes to the US biofuels industry

Business Model:
Novozymes supplies enzymes to the bioethanol production industry and has more than 60% of the market. We provide the ethanol industry with the best use cost via higher performing enzymes that deliver greater yields and efficiencies to our customers' operations

Competitive Edge(s):
Novozymes is the leader in enzyme technology with the best-performing enzymes in the industry for both starch and cellulosic bioethanol. We have 150 scientists dedicated to cellulosic ethanol research and development –an unprecedented effort in our company's history.

Distribution, Research, Marketing or Production Partnerships or Alliances:
Novozymes is the market leader in all segments and partners with many of the industry leaders, such as Lignol, Inbicon, COFCO, Sinopec, and POET to optimize their individual processes for ethanol production.

Website URL: www.bioenergy.novozymes.com

12. Honeywell’s UOP

Based in: Illinois

Business:

Honeywell’s UOP has developed a renewable jet fuel processing technology, as well as a joint venture. UOP and Ensyn announced the formation of a new joint venture, dubbed Envergent Technologies, that will market technologies and equipment for generating power, transportation fuel and heating oil from biomass using pyrolysis. The joint venture will utilize forest and agriculture residues as feedstocks in a Rapid Thermal process, where feedstocks are heated in the absence of oxygen, to produce pyrolysis oils that can be utilized directly in heating oil or power gen. UOP also owns a Renewable Energy & Chemicals business that produced green diesel using its Ecofining process. UOP and Vaperma announced a partnership to bring Vaperma's polymer membrane technology to the ethanol industry, where it will reduce energy consumption and emissions for for first-generation ethanol, as well as cellulosic ethanol and butanol.

Model:

Licensor; often develops technologies in partnerships.

Past milestones:

In 2006-09, Virgin Atlantic, Continental, Japan Air Lines and Air New Zealand and the group as a whole conducted a series of laboratory, ground and flight tests, indicating that test fuels performed as well as or better than typical petroleum-based Jet A. The tests revealed that using the Bio-SPK fuel blends had no adverse effects on the engines or their components. They also showed that the fuels have an average 1.8 percent greater energy content by mass than typical petroleum-derived jet fuel.

In 2009, at the Paris Air Show Boeing and a series of partners involved in four biofuels-based test flights released the data from the tests, and said that with the release they are on a path towards flight certification of biofuels as soon as late 2010. **Future milestones:**

UOP expects to commence licensing its fuel technology in 2009, and said that it has already commenced advanced discussions with multiple potential licensees.

The consistent message from airlines and aircraft manufacturers is that the certification of biofuels for regular commercial flights is in the 2012/13 timeline. Boeing spokesman Terrance Scott said that biofuels could be a regular source for jet fuel with 3-5 years, with algae becoming a common component in 8-10 years. **Metrics:** UOP said that it was modeling future refineries for renewable jet fuel using a 60-150 Mgy scale, and said that while this was only a fraction of the typical 4.2 billion gallon per year scale of a typical oil refinery that the size was the most effective given the expected supply chain for renewable jet fuel feedstocks. UOP said that it expects the cost of refineries to be in the $150 million range.

UOP quotable quotes:

"Although biofuels have been successfully tested at 50 percent blends, industry guidance is pointing to a 30 percent blend. The consistent view is that drop-in fuels that do not require changes in infrastructure will be the norm."

13. Gevo

Based in:

345 Inverness Dr. South; Bldg. C; Suite 345, Englewood, CO 80112

Year Founded:

2005

Annual Revenues:

N/A

Technology:

Gevo has two proprietary technologies that combine to make it possible to retrofit existing ethanol plants to produce isobutanol, a four carbon alcohol which serves as a hydrocarbon platform molecule. We have developed a robust industrial scale yeast biocatalyst to produce isobutanol without typical byproducts operating at parameters equivalent to commercial ethanol producers. The second piece of technology is a separations unit that operates continuously and removes isobutanol during fermentation. This helps reduce distillation requirements, thereby reducing process energy consumption. With our exclusive engineering partner, ICM, Gevo plans to complete its first commercial retrofit of a 22 MGPY corn ethanol plant in Luverne, MN and start producing isobutanol by the first quarter of 2012. In the meantime, we will continue to produce ethanol.

Fuel type:

Gevo will produce isobutanol, a four carbon alcohol that can be dehydrated using well known technology to isobutylene, a C4 hydrocarbon. Isobutanol has 30% more energy content than ethanol and can be blended into gasoline without modifying automobile engines. Isobutanol is a low RVP blendstock and less soluble in water than ethanol. It can be transported in pipelines and be dispensed in existing retail pumps. Isobutanol is a biofuel that carries a RIN value of 1.3 and It can be an advanced biofuel from corn if it achieves a 50% GHG reduction.

Isobutanol also has a market as a chemical solvent. The opportunity for isobutylene spans many C4 markets in jet fuel, paraxylene, PET and other multi-billion dollar applications in fuels, synthetic rubber, chemicals and plastics.

Gevo has a number of off-take agreements and has announced non-binding letters of intent to supply Total for gasoline blendstock; United Airlines for biojet; Lanxess for butyl rubber; and, Toray industries for p-xylene.

Major investors:

Khosla Ventures, Burrill & Company, Virgin Green Fund, Malaysian Life Science Fund, Total SA & LANXESS

Past milestones (09-10):

Gevo successfully commissioned its 1MGPY demonstration plant in late September, 2009 in St. Joseph, MO in cooperation with ICM. In September of 2010, Gevo completed acquisition of the 22 MPGY ethanol plant owned by Agri Energy in Luverne, MN. Retrofit construction is planned to begin early in 2011 and be completed by the end of the year. Isobutanol should begin production in Luverne early in 2012.

3 major milestone goals (2011-12)

We plan to be in commercial production early in 2012 in Luverne, MN. We also plan to bring another 50-200 MGPY of capacity into the development pipeline. Further commercial supply agreements are expected to be announced. In 2011-12, Gevo will begin to implement its ex-USA strategy.

Business model:

Gevo has developed its technology to retrofit ethanol plants to produce isobutanol. Gevo has a flexible business model, i.e., it will own and operate production capacity or align with others in joint venture or lease arrangements. Gevo will also license its technology. We plan to partner with cellulosic conversion companies to develop and commercialize cellulosic isobutanol for the gasoline and jet fuel markets.

Fuel cost: Gevo's isobutanol should be competitively priced with C4 petrochemical streams and low RVP gasoline blendstock components.

Competitive edge:

Gevo's proprietary retrofit technology is a cost efficient (approx. $0.40/gallon) and rapid (12 months) retrofit of first generation ethanol capacity to make isobutanol. Gevo's exclusive collaboration with ICM, the premier engineering services company in the ethanol industry with over 60% of the installed capacity, is another competitive advantage. Finally, our flexible business model enables us to work with investor owned and farmer owned ethanol producers through acquisitions, joint ventures or lease arrangements. Gevo will be able to deploy cellulosic butanol technology as soon as conversion technology is available for biomass refineries.

Alliances and Partnerships:

Gevo has an exclusive collaboration with ICM for the retrofit of ethanol plants in North America. Gevo also has an exclusive technology alliance with Cargill to develop a yeast biocatalyst for cellulosic isobutanol.

Development stage

Commercial

Website:
www. Gevo.com

14. Range Fuels

Based in:
11101 W. 120 Ave., Suite 200th , Broomfield, CO 80021

Year Founded:
2006

Annual Revenues:
Range Fuels' first commercial cellulosic biofuels plant, located near the town of Soperton, Georgia is scheduled to begin production in the second quarter of 2010. Specific financial information is proprietary.

Technology:
Range Fuels is focused on commercially producing low-carbon biofuels, including cellulosic ethanol, and clean renewable power using renewable and sustainable supplies of biomass that cannot be used for food. The company uses an innovative, two-step thermo-chemical process to convert non-food biomass, such as wood chips, switchgrass, corn stover, sugarcane bagasse and olive pits to clean renewable power and cellulosic biofuels.

Range Fuels' Two-step Thermo-chemical Conversion Process
In the first step of the process heat, pressure and steam are used to convert the non-food biomass to a synthesis gas or syngas. Excess energy in this step is recovered and used to generate clean renewable power. In the second step the cleaned syngas is passed over a proprietary catalyst and transformed into cellulosic biofuels, which can then be separated and processed to yield a variety of low carbon biofuels, including cellulosic ethanol and methanol.

These products can be used to displace gasoline or diesel transportation fuels, generate clean renewable energy or be used as low carbon chemical building blocks.

Range Fuels is employing its proprietary two-step thermo-chemical conversion process in its first commercial cellulosic biofuels plant currently under construction and scheduled to begin production in the second quarter of 2010.

Fuel type:
Range Fuels' thermo-chemical conversion process can generate a suite of low carbon biofuels from non-food biomass that can reduce the country's dependence on foreign oil, create immediate jobs, and dramatically reduce GHG emissions. Major products potentially yielded include cellulosic ethanol, methanol, dimethyl ether, diesel fuel, green gasoline and clean renewable power. Potential customers for Range Fuels' low carbon biofuels and clean renewable power include consumers, refined petroleum product suppliers, utilities and industrials, chemical companies, vehicle fleet operators and

biodiesel producers.

Major investors:
Range Fuels and the Soperton Plant are supported by over $250 million in support from public and private sources, including a $76 million grant from the U.S. Department of Energy, an $80 million loan guarantee from the U.S. Department of Agriculture, and over $100 million from an oversubscribed Series B financing round completed in the spring 2008. The Company has also secured state and local incentives to support development of the Soperton Plant.

Range Fuels was founded by Khosla Ventures LLC, a venture capital firm focused on the creation of renewable, environmentally-friendly energy sources. Range Fuels closed its Series B financing round, in which it raised over $100 million, in the spring of 2008. Investors in this round included Passport Capital, BlueMountain, Leaf Clean Energy Company (advised by EEA Fund Management Ltd. and Shaw Capital), Morgan Stanley, and PCG Clean Energy & Technology Fund (with participation by California Public Employees' Retirement System). Range Fuels also received a $76 million grant from the U.S. Department of Energy, an $80 million loan guarantee through the U.S. Department of Agriculture and a grant of $6.25 million from the State of Georgia for the Soperton Plant project.

Past milestones:

In the spring of 2008 Range Fuels, Inc. closed its Series B financing round, raising over $100 million to help finance construction of its commercial cellulosic biofuels plant near the town of Soperton, Georgia.

In November 2008 David C. Aldous joined the company as Chief Executive Officer, bringing 28 years of petrochemical experience to apply to the successful construction and operation of Range Fuels' first commercial cellulosic biofuels plant. Immediately prior to joining Range Fuels, Aldous was Executive Vice President Strategy and Portfolio for Royal Dutch Shell in London, where he had responsibility for strategy, mergers, acquisitions, divestments, consulting, global systems, health, safety, security, environmental, and technology for Shell's downstream business with revenues of more than $300 billion.

In January 2009 the U.S. Department of Agriculture awarded Range Fuels a conditional commitment for an $80 million loan guarantee to assist construction of its commercial cellulosic biofuels plant near Soperton, Georgia. The loan guarantee falls under the Section 9003 Biorefinery Assistance Program authorized by the 2008 Farm Bill, which provides loan guarantees for commercial-scale biorefineries and grants for demonstration-scale biorefineries that produce advanced biofuels or any fuel that is not corn- based. The Biorefinery Assistance program is intended to assist in developing new and emerging technologies that produce advanced biofuels to increase the nation's energy independence; promote resource conservation, public health, and the environment; diversify markets for agricultural products and waste material and spur rural economic development.

In spring 2009 the Company intensified construction efforts on Phase 1 of the Soperton Plant, Reaching over 200 contractors and employees on site managing construction activities by the fall with major process systems delivered and installed at the site.

In summer 2010, Range announced that it has commenced production of cellulosic methanol from the initial phase of its first commercial cellulosic biofuels plant near Soperton. The first phase of the Soperton Plant operations employs Range Fuels', two-step thermo-chemical process to convert cellulosic feedstocks into a synthesis gas composed of hydrogen and carbon monoxide. The syngas is then passed over a proprietary catalyst to produce mixed alcohols that are separated and processed to yield a variety of low-carbon biofuels, including cellulosic ethanol and methanol.

Range Fuels plans to begin production of cellulosic ethanol from the plant in the third quarter this year. The cellulosic ethanol will meet ASTM standards for fuel-grade ethanol and will be used to displace gasoline in local and regional transportation fuel markets.

The Soperton plant will initially use woody biomass from nearby timber operations, but plans to experiment with miscanthus and switchgrass.

Future: milestones

To advance build-out of the next phase of the Soperton Plant.

Business model:

Range Fuels' will design, build, own and operate cellulosic biofuels plants in targeted development regions. Range Fuels goals are:

• To be first to market with commercially produced cellulosic biofuels by building on the Company's eight plus years of pilot plant operating experience and successful public and private financial support secured via an $80 million loan guarantee from the U.S. Department of Agriculture, an $100 million plus oversubscribed Series B round of private financing, a $76 million grant from the U.S. Department of Energy and a $6.25 million grant from the State of Georgia.
• To rapidly gain market share by capturing the best plant locations, i.e. those areas that have large, available supplies of low-cost renewable biomass that cannot be used for food, are sustainable and are near significant markets for low carbon biofuels and clean renewable power markets.
• To become the premier cellulosic biofuels producer by building a world-class project management team, with a focus on continuous process improvements to improve product yields and efficiencies, while simultaneously driving operating and capital costs down to become the low marginal cost supplier of cellulosic biofuels.

Fuel cost:
Range Fuels projects its operating costs will be competitive without financial support from the government. Specific cost information is proprietary.

Competitive edge(s): (e.g. Distribution, economies of scale, low-cost, quality, location, vertically integrated model, location, yield, genetics).

Range Fuels' proprietary two-step thermo-chemical process can convert any type of non-food biomass into cellulosic biofuels. This feedstock flexibility reduces reliance upon specialized crops and any single geographic region as a feedstock source, which differentiates the process from traditional starch-based ethanol production and 2nd generation bio-chemical conversion processes, and promotes stable biomass supply and pricing.

The process can produce a variety of low carbon biofuels that can be used to displace gasoline or diesel transportation fuels, generate clean renewable energy or be used as low carbon chemical building blocks. This ability to produce a variety of cellulosic biofuels, as well as produce clean renewable power in the process, reduces exposure to price volatility typically associated with specific commodity markets.

Range Fuels' technology has a zero carbon footprint and very low emissions. Our carbon life cycle analysis using standard models and including the positive impact of our generation of clean renewable power shows our Soperton Plant project, at full capacity, will have a negative carbon footprint or in other words we will have a greater than 100% reduction in greenhouse gases compared to fossil fuel-derived gasoline. This advantage relative to conventional starch-based ethanol production and traditional transportation fuels will become increasingly valuable as low carbon fuels standards and climate change legislation is implemented.

Additionally, Range Fuels is the only company to have raised the necessary capital to begin construction on a commercial-scale cellulosic biofuels plant. Range Fuels has commenced construction on its first commercial cellulosic biofuels plant and plans to begin production from Phase 1 of the Soperton Plant in the second quarter 2010.

Alliances and Partnerships:

Range Fuels' partners include:
• AMEC, providing non-process related engineering services, permitting-related services and construction management services for the Soperton Plant;
• CH2M Hill Companies, Ltd., providing additional permitting-related services for the Soperton Plant;
• Merrick & Company, assisting in process engineering design and design related services

for Range Fuels' biomass and catalytic syngas converters;
• Emerson Electric Co., supplying process control and automation systems plus system design and expertise;
• The Price Companies, Inc., providing feedstock procurement and wood chip handling services;
• TransMontaigne Product Services Inc., providing product marketing services; and
• Ceres, Inc., supporting use of dedicated energy crops to produce cellulosic biofuels.

Development stage

Range Fuels is currently constructing Phase I of its first commercial-scale cellulosic biofuels plant near Soperton, Georgia, which will employ Range Fuels' innovative, two-step thermo-chemical conversion process. The plant will be the first in the U.S. to produce commercial quantities of low carbon biofuels from biomass, which includes all plant and plant-derived material, such as wood, grasses, and corn stover, and will also generate clean renewable power from energy recovered in the process of converting non-food biomass to cellulosic biofuels.

Range Fuels' Commercial Cellulosic Biofuels Plant, Soperton, Georgia

The Soperton Plant will initially use wood from nearby timber operations and will transition to leftover wood residue over time. At full build-out capacity, the Soperton Plant is permitted to produce 100 million gallons of cellulosic biofuels each year and can use 2,625 dry tons of feedstock daily.

The design of the Soperton Plant was informed by the operation of a fully integrated and automated pilot plant in Denver, Colorado, which successfully converted Georgia pine and hardwood as well as Colorado beetle-kill pine to cellulosic biofuels since the first quarter of 2008.

Range Fuels' Optimization Plant, Denver, Colorado

The Denver-based Optimization Plant is a 4th generation pilot plant employing the two-step thermo-chemical conversion process being used by Range Fuels' commercial cellulosic biofuels plant currently under construction near Soperton, Georgia. Over 10,000 hours of testing were performed on the four generations of pilot plants, which over an eight-year period processed over thirty different non-food biomass feedstocks, including wood waste, grasses, municipal solid waste and hog manure.

Website:
www.rangefuels.com

15. Abengoa Bioenergy

Addresses:
St. Louis

Year Founded:

USA - 1982
EU - 1998
Brazil - 2007

Annual revenues:

(Parent Company) Abengoa is a technological company that applies innovative solutions for sustainable development in the infrastructure, environment and energysectors. Revenues and Gross Cash Flows in 2008 of 3,114.5 and 545.3 million euros, respectively. Operations in over 70 countries. Abengoa's strategic development is based on generating forward-lookingoptions needed for a sustainable world.

Type of technology(s):
a. Traditional fermentation of cereal grains and sugar cane for the commercial production of bioethanol
b. Traditional transesterification for the production of biodiesel from cereal and vegetable oils.
c. Multiple technology options for the commercial demonstration of cellulosic fuel production.

Fuel Type:
Bioethanol, biodiesel.

Major investors.
Parent Company is public (ABG) on the Madrid (SIBE) exchange.

Past milestones:

- New Facility start-ups
  - Biodiesel (San Roque, Spain)
  - France ethanol plant (55 MMGPY)
  - Indiana and Illinois grass-roots ethanol facilities (88 MMGPY each)
  - Biomass commercial demonstration facility at BCyL, Spain
- Commenced construction:
  - Two 70-MW Cogen facilities at both Brazil facilities

- o 110 MMGPY ethanol facility in Rotterdam
- · Instituted GHG Inventory system to support Sustainability goal.
- · EU Parliament approved Renewable Energy and Fuel Quality Directives.
  - o Direct Blending of ethanol in Spain

Future milestones:

Abengoa is exploring the installation of a second ethanol plant in the Madison area following the launch of its $250 million ethanol plant there last week. The new plant would be second-generation using corn stalks or prairie grass as feedstock whereas the new plant will use 32 million bushels of corn per year.

· Commence construction:
- o DOE Biomass commercial demonstration facility (15 MMGPY)
- o Ethanol facility in UK
- o Ethanol facility in Germany

· Complete construction and start-up of three 75-MW Cogen facilities in US
· Certify products as Sustainable using GHG reduction data, Certificates of Origin

Business model:
Owner / Operator

Fuel cost:
Depends on feedstock cost and energy cost.

Competitive edge(s):
Distribution (own marketing company), economies of scale provides low-cost, quality (only Fuel Ethanol company that is registered to ISO-9001), locations (three continents), R&D investments.

Distribution, research, marketing or production partnerships or alliances.

Industrial Partners

§ NatureWorks (formerly Cargill Dow)
§ Novus International
§ Monsanto
§ Genencor
§ O2Diesel

Universities

§ Auburn University
§ Kansas State University
§ University of Concepción
§ University of Buenos Aires
§ Lund University
§ University of Sevilla
§ University of Nebraska

Research Centers

§ Asociación de Investigación y Cooperación Industrial de Andalucía - AICIA
§ Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas - CIEMAT
§ National Renewable Energy Laboratory - NREL
§ Pacific Northwest National Laboratory - PNL
§ Argonne National Laboratory - ANL
§ Instituto Catalysis y Petroquimicos - ICP
§ Instituto Tecnologico de Aragon - ITA
§ Centro de Investigacion y Desarrollo en Automocion - CIDAUT
§ Washington University - St. Louis
§ UOP

Stage
Commercial, pilot and demonstration.

Website URL.
www.abengoabioenergy.com

16. PetroAlgae

Company name: PetroAlgae Inc.

Company description:

PetroAlgae is a renewable energy company currently licensing and deploying the leading biomass production platform to address existing and growing unmet needs in the global energy and agriculture markets. Our proprietary technology, consisting of light and environmental management systems, allows our customer licensees to grow aquatic microorganisms at a rate that consistently exceeds natural growth rates. This enables the commercial-scale production of two end-products: a fuel feedstock, which we refer to as our biocrude, and protein products. The fuel feedstock is intended to be used principally in existing refineries, resulting in renewable fuels which are functionally compatible with the petroleum-based fuels they would replace. The high productivity afforded by our technology leads to fuel feedstock which should increase the profitability of the refineries without the requirement for any government subsidies.

Address:

1901 S. Harbor City Blvd, Ste 300, Melbourne, FL 32901

Year Founded: 2006

Chief Executive Officer:

John Scott, CEO

Annual Revenues:

PetroAlgae has not recorded revenues through March 31, 2010.

Major Investors:

PetroAlgae is listed on the OTC under the trading symbol "PALG"

Type of Technology(ies)

Our proprietary technology, consisting of light and environmental management systems, allows our customer licensees to grow aquatic microorganisms at a rate that consistently exceeds four times the natural growth rates. This enables the commercial-scale production of two end-products: a fuel feedstock, which we refer to as our biocrude, and protein products. The fuel feedstock is intended to be used principally in existing refineries, resulting in renewable fuels which are functionally compatible with the petroleum-based fuels they would replace. The high productivity afforded by our technology leads to low cost fuel feedstock which should increase the profitability of the refineries without the requirement for any government subsidies.

Feedstocks:

Biocrude

Fuel Type

Fuels that can be produced from the biocrude feedstock include renewable diesel, renewable jet fuel, and renewable gasoline. Also the feedstock can be used in combustion processes.

Fuel Cost (if applicable - per US gallon):

For our customer licensees engaged in the energy market, the value of our protein product offsets the cost of production, resulting in biocrude produced at a low marginal cost. As a result, we believe that the end-products produced by the licensees of our technology and processes will remain commercially viable even with crude oil prices as low as $20 per barrel. The profitability of our license units is not dependent on government subsidies or historically high oil prices.

Offtake partners (if applicable)

Currently PetroAlgae has several offtake partners. Details are protected under NDA.

Co-products (if applicable)

PetroAlgae technology ultimately creates two end-products: a fuel feedstock and a protein, which we refer to as our biocrude and protein products.

3 Top Milestones for 2009-10

- During 2009, we developed our proprietary remote sensing system (consisting of multi-spectral cameras and imaging algorithms) that enables us to measure micro-crop density. In addition, during that time we identified the approximately 150 micro-crop species that are most suitable for our processes from among over 5,000 species that could be used for the commercial generation of biomass.

- In 2009, we entered into an MOU with Foster Wheeler for the purpose of developing and co-marketing end-to-end market solutions for the large-scale production of green renewable gasoline, diesel and jet fuel in existing petroleum refineries.

- During 2009 and 2010 (to date), we have signed MOUs with five prospective customer licensees representing up to 18 license units.

- In June 2009, we completed our working demonstration facility consisting of two full-scale bioreactors (approximately one hectare each) that display our technology and processes and demonstrate the micro-crop yield that each bioreactor can generate.

- In November 2009, the Indonesian Ministry of Agriculture cleared our protein product as an approved raw material for use in animal feed. We are in the process of obtaining additional animal feed approvals in nine other jurisdictions.

3 Major Milestone Goals for 2011-13

Unable to make forward looking statements.

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

PetroAlgae's primary business model is to license this technology to large customers who will commercially produce biomass, which in turn is processed into two co-products: (1) renewable fuel feedstock, and (2) protein for supplementation of animal feed and potentially human food ingredients.

Competitive Edge(s):

PetroAlgae addresses the production of renewable fuels through photosynthesis and we have a currently commercially viable system to address the commodity fuel and food markets based on this approach. Many companies are focusing their efforts on the higher value but smaller specialty chemical or nutraceutical markets which do not require the same volumes of biomass to be economic. Some of our competitors are using genetically modified or selectively-bred organisms that are designed to encourage certain properties (such as high lipid production). Microorganisms that produce high concentrations of lipids produce lower amounts of protein and carbohydrates. PetroAlgae's approach uses indigenous species exclusively and promotes optimal growth. The resultant organisms produce a high proportion of valuable protein that is part of the success of our business model.

Distribution, Research, Marketing or Production Partnerships or Alliances.

Foster Wheeler AG

PetroAlgae has signed a Memorandum of Understanding with Foster Wheeler AG's (Nasdaq: FWLT) Global Engineering and Construction Group for engineering services to be performed in conjunction with PetroAlgae's micro-crop technology, which allows for the production of dry biomass at an unprecedented scale. PetroAlgae intends to work with Foster Wheeler to develop commercial solutions that will allow existing oil refineries to convert micro-crop biomass into fuels that are functionally compatible with petroleum-based fuels in the current market. For refineries, the solutions are expected to provide strong economics from the large-scale processing of PetroAlgae's micro-crop biomass into green fuels. The two firms will create end-to-end market solutions for the large-scale production of green gasoline, diesel, jet fuel and specialty chemicals.

Stage (Bench, pilot, demonstration, commercial)

PetroAlgae is beyond demonstration stage. Our "commercial demonstration facility" was completed in June 2009 and has been in continuous operation since then. PetroAlgae has signed initial agreements with commercial intent.

Website URL

www.petroalgae.com

17. Synthetic Genomics

Based in:
California

Business:

Synthetic biology and algal fuel developer.

Model:

R&D partner

Past milestones:

ExxonMobil, the last of the oil majors to commit to a major investment in biofuels, announced that its Research and Engineering unit will invest $300 million into in-house algae research, and up to an additional $300 million in La Jolla-based Synthetic Genomics, the genetics firm founded by J. Craig Venter that has been working on algae-to-energy research since 2005.

SGI has developed techniques for harvesting algal oils, and will focus research on increasing lipid content by manipulating algal strains. The ExxonMobil investment in SGI is contingent on the meeting of R&D goals, according to a report in the New York Times.

"This agreement between SGI and EMRE represents a comprehensive, long-term research and development exploration," said Venter. "We are confident that the combination of our respective expertise in science, research, engineering and scale-up should unlock the power of algae as biological energy producers in methods and scale not previously explored."

"After considerable study, we have determined that the potential advantages and benefits of biofuel from algae could be significant," said Emil Jacobs, EMRE's VP of R&D.

The venture is presented as a research collaboration rather than a commercialization effort at his stage, and could be classified to some extent opposite a $500 million investment made in 2007 by BP in the Energy Bioscience Institute. Chevron has also previously partnered with Solazyme and the National Renewable Energy Laboratory on research efforts in the algae-to-energy field. But for sheer magnitude of investment, the focus on a single bioenergy feedstock, and the focus on a single R&D partner in Synthetic Genomics, the announcement is without parallel in biofuels history.

It may not be possible to interpret this investment as, in itself, a new and imminent path towards algal fuel commercialization, but it can be regarded as confirmation that ExxonMobil, after a famously long delay, has entered the renewable energy arena, and is placing its bet on algae.

What does this bode for other high-profile algae-to-energy companies?

"We think it's good for algae, and good for us," said Tim Zenk, VP of Corporate Affairs for Sapphire Energy. "The research collaboration announced today sends a loud and clear message that drop-in-replacement liquid transportation fuel produced from algae, above all other biologic choices, is the most viable option to replace crude oil. Algae fuels have significant environmental benefits over crude oil with lower carbon emissions, and are scalable to help nations transition to a secure energy future."

Algae 2020 author Will Thurmond was similarly bullish. "Exxon-Mobil's $600 million dollar commitment to algae based bio-crude and biofuels," Thurmond said, "represents another affirmative commitment by major petroleum companies, research laboratories, private investors and governments that are looking beyond the research and development phase, and are now entering the next stage to scale up and build out industrial-scale systems based on innovative, emerging and disruptive technologies."

In July, Exxon Mobil and Synthetic Genomics announced the opening of a greenhouse facility today enabling the next level of research and testing in their algae biofuels program. In the greenhouse facility, researchers from ExxonMobil and SGI will examine different growth systems for algae, such as open ponds and closed photobioreactors. They will evaluate various algae, including both natural and engineered strains, in these different growth systems under a wide range of conditions, including varying temperatures, light levels and nutrient concentrations. They will also conduct research into other aspects of the algae fuel production process, including harvesting and bio-oil recovery operations.

Future milestones:

In California, a report on Craig Venter in Discover focuses on the Syntehtic Genomics founder's ambitions to develop synthetic life forms. While researchers have succeeded in "stitching together pieces of synthesized DNA" and transplanting that to a host bacterium; but the bacterium has been rejecting the genome as an invader, until recent efforts to add methyl tags to M. mycoides allowed the genome to go unnoticed by the bacterial defense system.

The prize? Energy microbes that become monocellular biorefineries, consuming waste energy and converting it to biofuels. It is unclear whether the Synthetic Genomics research effort with ExxonMobil in algae will directly benefit from the R&D effort, as algae is a much more highly complex organism than bacteria. But Venter told the Times, "Assuming we don't make any errors, I think it should work and we should have the first synthetic species by the end of the year."

Metrics:

$300 million commitment to SGI is reportedly on a milestone-based, stage-gate basis.

18. Petrobras

Based in:

Brazil

Business:

Oil and gas producer with sugarcane ethanol and biodiesel operations.

Model:

State-owned operator. Announced that it was not seeking to acquire distressed ethanol companies but would establish partnerships where appropriate to support development of the national ethanol industry. According to Petrobras management, the state oil giant would offer a guaranteed ethanol contract over 10 years in return for a minority stake in a project. Local developers would hold the majority interest.

Past milestones:

In November, Toyota's trading company, Toyota Tsusho established a joint venture with Taiwan's China Man-Made Fiber Corp, Greencol Taiwan with an initial capitalization of USD $123 million. Greencol will import sugar cane based ethanol from Braskem in Brazil, to produce mono ethylene glycol, a precursor to PET plastic.

In October, Petrobras agreed to a $1.2 billion deal to buy as much as 580 million gallons of ethanol from Açucar Guarani during the next four years. Petrobras already agreed at the end of April to buy 45.7% of the company from its French parent Tereos over the next five years.

In August. KL Energy and Petrobras announced that they have entered into a Joint Development Agreement to jointly optimize KLE's proprietary cellulosic ethanol process technology for sugarcane bagasse feedstock. As part of this agreement, The companies also said that they will develop a 4 Mgy bagasse-based cellulosic ethanol project that will be co-located with a Petrobras-owned sugarcane mill, which will come online in 2013.

In addition, Petrobras will provide $11 million to adapt KLE's demonstration facility to the use of bagasse, validate the optimized process by producing cellulosic ethanol and lignin and license the validated technology. The agreement has an initial term of 18 months and provides for mutual exclusivity in the area of developing cellulosic ethanol from bagasse. The latest generation of KLE's process design provides for substantial enhancements over the first generation, implemented in 2008 at the company's demonstration plant in Upton, Wyoming using Ponderosa Pine feedstock, including the ability to be optimized for multiple feedstocks.

Also in August, Petrobras confirmed that it has acquired a 50 percent stake in biodiesel producer Bioleo Industrial e Comercial, for $8.8 million.

According to Petrobras, "Bioleo is an oil extraction plant located in Bahia state, with capacity to process 130,000 tons (37 Mgy) of grains of several types of oilseeds. The unit has installed capacity to store 30,000 tons of grain and tankage for 10 million liters of oil." The company said that it would utilize proceeds from the investment for operational and safety upgrades at the facility.

In July, Petrobras and BIOeCON announced a partnership in the joint development of a process for conversion of sugarcane bagasse into chemicals, green plastics, or advanced biofuels. The new technology, called BiCHEM (Biomass Chemical Conversion), was developed by BIOeCON together with a team of top class scientists from Delft University of Technology in the Netherlands and the Universidad Politecnica of Valencia in Spain.

BICHEM technology uses a recyclable inexpensive solvent to dissolve a significant part of biomass. In such homogeneous phase, cellulose and hemicellulose are quickly converted to its simplest, sugar constituents. Those sugars are further hydrogenated and then finally converted to the chemicals of interest, which can be easily separated from the recyclable solvent. The approach allows to use the biomass to its fullest by converting all the carbon available in cellulose and hemicellulose to products and using much less energy.

In May, Petrobras and Portugal's Galp Energia announced a plan to invest up to $530 million to produce 300,000 metric tons of palm oil in Brazil and 250,000 tons of biodiesel in Portugal, starting in 2015. The palm oil will be used as feedstock for the biodiesel, which will be distributed in Europe. Each partner will invest half of the capital needed for the project.

The project is another in a series of joint ventures, mergers and consolidations in the Brazilian sugar and renewables sector since the 2008 global financial crisis toppled the credit structure of the renewables industry.Earlier in May, Petrobras took a 46 percent stake in Brazil's fourth largest ethanol group, Acucar Guarani (ACGU3.SA) for $920 million from France's Tereos.

Gabrielli said that "We are not only expanding our position in the ethanol market within Brazil. We want to be a big player in the international ethanol market. Right now we have a joint venture in Japan with a Japanese company that involves developing a business model to increase the ethanol market there. We own 87 percent of a refinery in Okinawa and we already sell gasoline blended with ethanol in Japan. We plan to use our facilities in

Japan to be an important hub in the ethanol business of that nation."

Petrobras Biocombustível CEO Miguel Rossetto said that the Brazilian state oil giant has targeted $2 billion in biodiesel and ethanol investment through 2013, and aims to achieve a 15 percent share of the Brazilian ethanol market and up to 25 percent market share in biodiesel.

Petrobras and Camargo Correa have combined their pipeline building efforts into a single entity, PMCC, that will link Uberaba in Minas Gerais to the sugarcane processing center of Paulinha in Sao Paulo state, and then to ports and export terminal in Sao Sebastiao and Ilha d'Agua. The pipeline is expected to commence operation in 2010, will be fully completed in 2012, and will transport up to 3.17 billion gallons of ethanol per year. The project cost is expected to reach $1.5 billion and will transport up to 40 percent of ethanol production from Brazil's southern region.

Future milestones:
Petrobras Biocombustível has previously announced plans to invest $475 million in the biofuels sector in 2009, and become a top 5 global biofuel producer by 2020 with a total investment program of $2.8 billion between 2009 and 2013.

Has entered into talks of partnership and/or investment with Brenco, the Brazilian ethanol producer that counts AOL founder Steve Case, Vinod Khosla and Bill and Hillary Clinton among its direct and indirect investors. Brenco said that it may sell a controlling stake to Petrobras, or merge with ETH Bioenergia, the ethanol company founded and controlled by Odebrecht.

Metrics:
Petrobras, which has set a goal of 500 Mgy in ethanol exports by 2013, said it will invest $2.5 billion in ethanol development through 2013, with another $800 million dedicated to biodiesel. Set a company $174.4 billion five-year business plan based on a baseline projection of $65+ oil.

19. Bluefire Renewables

Based in:
31 Musick, Irvine, CA 92618

Year Founded:
2006

Annual Revenues:
2009- 5 million

Technology:
BlueFire Ethanol's own commercially ready, patented, and proven Concentrated Acid Hydrolysis Technology Process for the profitable conversion of cellulosic ("Green Waste") waste materialsto ethanol, a viable alternative to gasoline.

Fuel type:
Ethanol

Major Investors
Quercus Trust owns approximately 20% of the company

Past milestones:

1. Received permits for Lancaster facility.
2. Teamed up with Solazyme
3. Deploying $40 MM award from U.S. Department of Energy to complete Mississippi facility
4. Changed name to BlueFire Renewables to reflect empahsis on chemicals and fuels.

In October, BlueFire Renewables announced that it has finalized and signed an Engineering, Procurement and Construction (EPC) contract for its cellulosic ethanol project in Fulton, MS. The facility will be engineered and built by Wanzek Construction, Inc., a wholly owned subsidiary of MasTec, Inc. (MTZ) , for a fixed price of $296 million which includes an approximately $100 million biomass power plant as part of the facility.

The contract is negotiated in a manner to be appealing for non-recourse project bank financing and, more importantly, serves as the final key project contract agreement to move forward with both the DOE and USDA Loan Guarantee Programs.

In the past three weeks, BlueFire had also announced the securing of 15-year offtake and feedstock contracts with credit worthy partners, and has thereby become the first advanced biofuels company to secure all three legs of the requirements generally associated with DOE loan guarantees. Though authorized since 2005 to issue loan guarantees for advanced biofuels technologies, the DOE has yet to issue one.

BlueFire is working with both the USDA and DOE loan programs, and over the past three years has secured $88 million in DOE grants. The company was established to commercially deploy the Arkenol Concentrated Acid Hydrolysis Technology Process for the profitable conversion of cellulosic waste materials into cellulosic ethanol, biodiesel, biojet fuel, and drop-in hydrocarbon fuels.

The influential Mas family, which founded MasTec and produced the current chairman, Jorge Mas, and the CEO, Jose Mas, are strong political backers of former DOE Director of the Office of Minority Impact, Joe Garcia, who resigned his position earlier this year to run for Congress.

The Fulton, MS project will allow BlueFire to utilize green and wood wastes available in the region as feedstock for the ethanol plant that is designed to produce approximately 19-million gallons of ethanol per year.

Future milestones:

1. Construct and begin operation of Lancaster facility
2. Finance and construct Fulton, MS facility
3. Company to become profitable

Business model:
Owner/operator.

Fuel cost:
For the 1st facility, the fuel production cost will be approximately $1.60 a gallon. Fuel cost will be sub $1 a gallon on larger facilities.

Competitive edge:
BlueFire will locate its facilities near the end markets for the ethanol which gives it a competitive advantage over traditional ethanol production. BlueFire will also be able to produce at a lower cost by being located next to or in existing landfills, eliminating transportation cost.

20. ZeaChem

Company description:

ZeaChem Inc. has developed a cellulose-based biorefinery platform capable of producing advanced ethanol, fuels and chemicals. Our indirect approach leapfrogs the yield and carbon dioxide (CO_2) problems associated with traditional and cellulosic based processes.

ZeaChem's patented process offers the highest yield, at the lowest cost, with the lowest fossil carbon footprint of any known biorefining method. Incorporated in 2002, ZeaChem is headquartered in Lakewood, Colorado and operates a research and development facility in Menlo Park, California.

ZeaChem's 250,000 gallon per year demonstration scale cellulosic biorefinery is currently under construction in Boardman, Oregon.

Address:

ZeaChem Inc. Headquarters
Union Tower
165 South Union Boulevard
Suite 380
Lakewood, CO 80228

Year Founded:

2002

Chief Executive Officer and contact email:

Jim Imbler
jimbler@zeachem.com

Annual Revenues:

Private

Major Investors:

Firelake Capital
Mohr, Davidow Ventures
Globespan Capital Partners
PrairieGold Venture Partners

Valero Energy Corporation (NYSE = VLO)

Type of Technology(ies)

ZeaChem has designed biorefineries to efficiently and cost-effectively convert biomass into chemical and fuel products. ZeaChem combines the best of biochemical fermentation and thermochemical processes into a hybrid process that achieves 40% higher yield than other cellulosic processes. ZeaChem's patented biorefining process uses an acetogen - a naturally occurring species of bacteria adapted to digest the tough carbon chains of cellulose - to extract the maximum amount of energy available from the feedstock. ZeaChem offers the highest yield, lowest production cost and lowest carbon emissions profile of any known biorefining process

Feedstocks:

The ZeaChem process is feedstock agnostic and can accept feedstock from a variety of sources including hardwood, softwood, switch grass and corn stover.

Fuel Type

Cellulosic Ethanol, with potential for other fuels including butanol.

Fuel Cost (if applicable - per US gallon):

ZeaChem products will compete with petroleum at $50/barrel. Ethanol production costs will be less than $1.00/gallon.

Offtake partners (if applicable)

ZeaChem will form strategic partnerships with fuel and chemical companies to bring ZeaChem products to market.

Co-products (if applicable)
ZeaChem's technology is unique by producing multiple product streams from a single biorefinery. This lowers risk by being flexible to changes in markets, economics, policies, or other factors. At this time, ZeaChem is currently deploying its C2 production platform which includes acetic acid, ethyl acetate and ethanol. The C3 product platform will be scaled up and deployed next, which includes propionic acid, propanol and propylene. ZeaChem's technology is also capable of producing C4 products such as butanol and C6 products including hexanol and hexane.

3 Top Milestones for 2009-10

1. In early June 2010, ZeaChem broke ground on their 250,000 gallon-per-year biorefinery in Boardman, Oregon.

2. In May 2010, ZeaChem and the U.S. signed a cooperative agreement for a $25M grant that will support construction and operations of the Boardman biorefinery. (ZeaChem announced it was selected for the grant in December 2009.)

3. In the first half of 2010, ZeaChem successfully scaled up its fermentation 10,000x compared to lab scale, demonstrating scale up levels and results needed for the Boardman biorefinery. Third party vendors verified concentration of the fermentation broth to glacial acetic acid, the conversion of the acetic acid to ethyl acetate and the final conversion to ethanol. The next step is to integrate these processes at the Boardman biorefinery.

3 Major Milestone Goals for 2011-13

1. Complete construction of 250,000 gpy plant in Boardman, Ore. in 2011 and begin production of ethyl acetate and ethanol.

2. Develop commercial scale C2 product biorefineries (acetic acid, ethyl acetate, cellulosic ethanol) upon successful operations at the integrated pilot facility in Boardman.
3. Scale up C3 (propylene glycol, acrylic acid & esters, propylene, methacrylic acid & esters) product platform to commercial refining capability.

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

Owner-operator and technology licensor

Competitive Edge(s):

- ZeaChem has developed a sustainable process for producing cellulosic ethanol that competes with oil at $50 a barrel.
- ZeaChem's process offers the highest yield (135 gallons per bone dry ton of feedstock) of any known process by combining biochemical fermentation with thermochemical gasification. The technology uses known industrial processes and integrates them in a novel way.
- ZeaChem cellulosic ethanol has 94-98% less CO2 emissions than conventional gasoline. ZeaChem uses a naturally-occurring acetogen to achieve its yield; no genetically modified microbes or special enzymes are required.
- ZeaChem's technology is feedstock agnostic and product flexible, greatly lowering

risk as infrastructure is deployed.

Distribution, Research, Marketing or Production Partnerships or Alliances.

Research & Construction Partners:

- Hazen Research (www.hazenusa.com)
- CH2M Hill (http://www.ch2m.com/corporate/)
- Burns & McDonnell (http://www.burnsmcd.com/portal/page/portal/Internet)
- U.S. Department of Energy, Biomass Program (http://www1.eere.energy.gov/biomass/integrated_biorefineries.html)
-

Research Partner:

- Sulzer Chemtech Ltd. (www.sulzerchemtech.com)
- Koch Modular Process Systems, LLC (www.modularprocess.com)

Stage (Bench, pilot, demonstration, commercial)

Pilot

Website URL:

www.zeachem.com

21. Virent Energy Systems

Based in:
3571 Anderson Street, Madison, WI 53704 (608) 663-0228

Year Founded:

2002

Annual Revenues:

Confidential

Technology:

Virent's patented catalytic BioForming process combines proprietary aqueous phase reforming (APR) technology with established petroleum refining techniques to generate the same range of hydrocarbon molecules now refined from petroleum.

Fuel type:

Green gasoline, diesel, jet fuel, and chemicals previously refined only from petroleum.

Major investors:

Cargill Ventures, Honda Strategic Ventures, Venture Investors LLC, and Advantage Capital.

Past milestones:

- Announced collaboration with Royal Dutch Shell to develop biogasoline.
- Exceeded technical milestones and began scale-up of biogasoline production, including shipment of product for testing.
- Received prestigious government and industry recognition including the US EPA's Presidential Green Chemistry Challenge, the World Economic Forum's Technology Pioneer, Red Herring 100 North America, and ICIS Innovation awards.
- In March, Virent and Shell announced the successful startup of the Virent "Eagle" demonstration plant, producing 10,000 gallons per year of biogasoline, a drop-in renewable fuel.
- In June, Shell announced that it has taken an equity stake in Virent and begun a joint technology program. In total, Virent closed a $46.4 million third round of funding in which Shell and Cargill deepened their commitment to Virent's

technology platform. The investment agreement also expands an existing research and development collaboration with Shell for the production of biogasoline to include diesel fuel. With its new equity stake, Shell will also have a seat on Virent's board.

- The financing follows a March 2010 milestone in which Virent announced the successful start-up of the world's first biogasoline production plant. The Virent demonstration plant can generate more than 10,000 gallons per year of premium biogasoline product and increases confidence in the commercial viability of the technology. The "Eagle" project represents a 100X scaleup from the company's previous bench level, and utilizes sugars derived from biomass, passed over over catalytic process, similar to oil refinery. Virent CEO Lee Edwards said that the company is using primarily sugarbeet sugar, and has tested cane, corn in the pilot plant as well; at bench level, the company has also tested sugars from non-food biomass.

Future milestones:

- Design and construct commercial scale facility for the production of biogasoline.
- Complete additional strategic investments.
- Begin scale-up of diesel and jet fuel production.

Business model:

Owner/operator and licensing within strategic relationships

Fuel cost:

Preliminary analysis suggests that Virent's BioForming process can compete economically with petroleum-based fuels and chemicals at current feedstock and crude oil prices ($60-70/bbl).

Competitive edge:

Virent's BioForming technology provides numerous competitive advantages:

Premium Liquid Fuel Products:

The technology produces a wide range of high quality hydrocarbon fuels that have no barriers to full market adoption. With the same composition and energy content as petroleum fuels, these biofuels can be distributed through existing pipelines and fuel pumps, and used at high blends with, or as drop in replacements for, petroleum fuels in today's engines. They can also work in applications currently without viable biofuel solutions, such as air travel.

Feedstock Flexibility:

Sugar mixtures, including 5 and 6 carbon sugars, disaccharides, and other water soluble polysaccharides derived from sugar and energy crops, as well as agricultural and forestry waste, are possible feedstocks. This flexibility translates into more biomass options and lower input costs.

Low Carbon Fuels:

The process is CO_2 neutral, water positive, and has low life cycle emissions. This energy efficient, exothermic process runs under moderate conditions and requires no external energy inputs. The process yields 30% more net energy than corn ethanol due to the natural separation of gasoline from water (ethanol distillation requires energy inputs of nearly 50% of its final energy content).

Robust Catalytic Process:

Catalysts provide increased productivity due to faster chemical reactions, proven process reliability, reduced energy requirements, and demonstrated scalability to large production volumes. In contrast to biological processes, which depend on living enzymes or microbes, catalysts are capable of utilizing variable feedstocks and of producing a range of molecules.

Cost-Competitive Biorefinery Solution:

Feedstocks and end products can be optimized based on local market conditions. This fast and continuous (versus batch) process lowers capital expenditures, while low energy requirements reduce operating costs. Together, these attributes provide a biorefinery solution with a broad mix of high value products that are competitive with petroleum products at current prices.

The BioForming process is a practical biorefinery alternative that can speed the use of non-food plant sugars as an energy source in place of petroleum, thus decreasing dependence on fossil hydrocarbons while minimizing the impact on global water and food supplies. Virent's ability to produce hydrocarbon products that are both sustainable and economical is truly transformative.

Alliances and Partnerships:

- Virent is collaborating with Royal Dutch Shell to develop and commercialize biogasoline.
- A tier one automobile company is supporting efforts to determine biogasoline's suitability in current and next generation engines.

Development stage:

Pilot/Demonstration

Virent is currently building the world's first demonstration unit for the catalytic conversion of plant sugars to gasoline. The plant will have an annual capacity of 10,000 gallons.

Website

www.virent.com

22. Qteros

Company description:
Qteros is accelerating the global commercialization of large-scale, lowest cost cellulosic ethanol production. We are collaborating with a core group of world-class strategic partners that complement and leverage our advanced microbiology and process engineering expertise to rapidly scale Qteros' highly efficient Consolidated Bioprocessing (CBP) platform for converting non-food biomass into biofuels. Qteros is funded by leading investors in the alternative energy industry including, among others, Venrock Associates, Battery Ventures, BP Technology Ventures, Soros Fund Management LLC, and Valero Energy Corporation.

Address:
100 Campus Drive
Marlborough, MA 01752

Year Founded:
2006

Chief Executive Officer:
John A. McCarthy, Jr.

Annual Revenues:
NA

Major Investors *(if a public company, please provide trading symbol and exchange).*
Venrock Associates
Battery Ventures
BP Technology Ventures
Soros Fund Management LLC
Valero Energy Corporation

Type of Technology(ies)
Qteros is developing a highly efficient, industry-standard Consolidated Bioprocessing (CBP) platform for converting a broad range of non-food-based biomass into ethanol. A key advantage of Qteros' CBP platform is the Company's proprietary micro-organism, the Q Microbe® (*Clostridium phytofermentans*)—a naturally occurring "biorefinery" whose biological structure produces all enzymes required for biomass degradation into sugars, after which the organism co-ferments of all C5 and C6 sugars into ethanol as its natural metabolic end product. This native, ethanol-producing capability enables a highly flexible engineering and technology platform that achieves improved fermentation rates, ethanol titers and yield, and lowers capital and operating costs, thereby enabling the lowest cost of cellulosic ethanol production.

Feedstocks:
Qteros' CBP platform is based on its broadly protected, feedstock-agnostic micro-organism, the Q Microbe®. Qteros' near-term feedstock strategy includes corn stover, wet distiller grains (WDGs) and bagasse processed at cellulosic ethanol facilities that are co-located with existing corn and sugarcane ethanol plants. Longer term, Qteros plans to focus its strategy on greenfield facilities processing energy crops (e.g., sorghum and energy cane) which represent the greatest opportunity for global commercial scale production of cellulosic ethanol.

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc)
Cellulosic Ethanol

Fuel Cost (if applicable - per US gallon): *(If you do not manufacture or have long-term stable feedstock pricing, please use the latest December futures contract pricing for traded feedstocks, or $55/ton for untraded biomass – or provide notes on your own feedstock pricing assumptions).*
Qteros estimates its current cost per US gallon of ethanol at less than $2.50/gallon. Qteros has a well-defined roadmap for achieving world-class economics (i.e. approximately $1.00/gallon without U.S. government subsidies) at commercially relevant scale by 2013.

Offtake partners (if applicable)
N/A

Co-products (if applicable)
Qteros' CBP platform creates two co-products from the fermentation of biomass to cellulosic ethanol:
1. Lignin: Used to generate steam and power to fuel the biomass-to-ethanol conversion process and, under some circumstances, excess for sale.
2. Ash: From power generation, used or sold for fertilizer

3 Top Milestones for 2009-10
- Formalize joint development and commercialization partnership(s) to accelerate Qteros' worldwide commercialization strategy
- Complete financing activities in 4Q'10-1Q'11
- Continued technology and engineering advancement to allow the company to achieve its short and long-term cellulosic ethanol production cost objectives

3 Major Milestone Goals for 2011-13
- Complete development of commercial Process Design Packages (PDPs) for converting non-food-based biomass into ethanol
- Achieve commercial-scale production at world-class economic price targets (i.e. approximately $1.00/gallon)
- Commence licensing of Qteros' PDPs across multiple partners and geographies

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)
Qteros has a capital-efficient, licensing business model that enables broad technology licensing opportunities across multiple partners and geographies. Qteros will license the Q Microbe®, Q Media and a PDP consisting of the requisite materials, technology licenses, know-how, information and documentation required to construct and operate a cellulosic ethanol facility at commercial scale.

Competitive Edge(s):

1. **Unique and Broadly Protected Technology Platform Built around the Q Microbe®**: The Q Microbe® is one of Qteros' key competitive advantage as the organism possesses the native ability to hydrolyze a broad array of biomass and efficiently ferment all sugars into ethanol. As such, Qteros is optimizing an micro-organism with native biological capabilities versus attempting to engineer one from scratch. Specific ethanol-producing attributes of the Q Microbe include:
    a. *The preferential digestion of oligomeric versus monomeric sugars which significantly reduces pretreatment severity.* This simplified pretreatment process streamlines process and engineering design and ensures maximum ethanol yield by minimizing production inhibitors caused by high-severity pretreatment processes.
    b. *The natural production all enzymes required to digest biomass.* The natural production of endogenous enzymes allows for an 80% reduction in exogenous enzymes requirement today,, and Qteros expects to eliminate the need for the addition of any exogenous enzymes over time.
    c. *A natural ability to simultaneously co-ferment all C5 and C6 sugars, thereby streamlining unit operations and reducing costs.* Additionally, the Q Microbe® is an anaerobic organism which minimizes production-related contamination risks associated with aerobic production processes.

    This unique combination of the Q Microbe®'s biological attributes equates to lower CAPEX and OPEX and higher ethanol yields and titers, thereby delivering the lowest cost production for cellulosic ethanol.

2. **Unique Ability to Achieve Near-Term World Class Economics at Commercially Relevant Scale:** Qteros' CBP platform can produce cellulosic ethanol at commercially competitive prices today. Our efficient biology, combined with Qteros' streamlined process engineering design, provides multiple low-risk pathways for Qteros to achieve world-class economic price points of approximately $1.00/gallon by 2013.

3. **Broad Partnerships Catalyze a Well-Defined Commercialization Strategy:** Qteros is partnering with technology and/or engineering firms that can co-develop and co-commercialize licensable PDPs to global customers across multiple feedstocks.

Qteros' commercialization strategy drives maximum revenue potential and market penetration with multiple partners across various worldwide geographies.

Distribution, Research, Marketing or Production Partnerships or Alliances.
National Renewable Energy Laboratory
Broad co-development and commercialization partnership to be announced in Q4 2010

Stage (Bench, pilot, demonstration, commercial)
Qteros is currently at 1,000L scale and expects to begin integrated pilot experiments at 10,000L in mid-2011.

Website URL
www.qteros.com

23. Iogen

Based in:
Canada

Business:
Cellulosic ethanol production

Model:
Owner-operator.

Past milestones:

In 2009, a Shell station in Ottawa became the first in the country to serve cars with cellulosic ethanol, offering a 10 percent blend of gasoline and wheat straw ethanol manufactured at a demonstration-scale cellulosic ethanol plan jointly owned by Shell and Iogen.

A representative of the joint venture said that a decision on expansion would be reached within 12 months, and did not rule out the possibility of constructing a commercial-scale facility in Idaho, where the company abandoned an effort to build a demonstration-scale plant.

Last October, Iogen announced that it had commenced shipments of a 47,000 gallon cellulosic ethanol order from venture partner Royal Dutch Shell. The companies first partnered in cellulosic ethanol in 2002 when Shell invested in Iogen. Shell subsequently increased its ownership stake in Iogen's technology to 50 percent in 2007.

Under an expanded agreement with Shell, Codexis will optimize the efficiency of Iogen Energy's cellulosic ethanol catalysts, as well as developing new to convert biomass directly into green gasoline or green diesel.

Future milestones:

The Saskatchewan provincial government signed an agreement with Iogen to support development the province's first cellulosic ethanol plant at a former pulp mill at Prince Albert owned by Domtar. Iogen will operate the plant, which will be a commercial-scale expansion of its wheat straw ethanol demonstration plant in Ontario. The Canadian government has pledged up to 40 percent of the cost of the project in the form of development grants. The plant will also feature power generation from forest residues.

In 2008, the Canadian federal government approved a $500 million cellulosic ethanol project plan by Iogen Corp for construction in Saskatchewan. Iogen execs said that they hoped to launch the 23 Mgy plant north of Saskatoon by 2011, using wheat straw and other cellulose as feedstock. Iogen is backed in the venture by Shell, Goldman Sachs and Petro Canada.

Metrics:
The Iogen technology has been operating at a 480,000 gallon per year capacity since 2004, and is currently evaluating options to construct an 18 Mgy plant in Saskatchewan, near Prince Albert.

24. Algenol

Based in:
Florida.

Business:
Algael fuel developer. Algenol explains that energy from the sun through photosynthesis produces simple sugars inside algae cells which, concurrently with enzymes, produce ethanol. Extremely fast growing algae renews the sugar supply.

Model:
Owner-operator and partner.

Past milestones:
in 2008, Biofields CEO Alejandro González Cimadevilla said that the company is targeting 2 billion gallons of ethanol from algae by 2020 using the Algenol process. The company said that it considered 15 other locations in Mauretania, Algeria, Spain, and the US, before settling on Sonora because of its 328 days of annual sunshine and 3.75 million annual tons of CO2 emitted by local power plant CFE.

The company said that it has purchased 22,000 hectares of unproductive land, and Gonzalez said that he will produce 250 Mgy by 2013, building off the recycling company, Grupo Gondi, founded by his father Luis Gonzalez Diez. Gonzalez has recruited Mateo Lopez, a former Mobil Oil senior construction executive in Mexico.

The company secured an exclusive license for the Algenol technology until 2013 when the company reaches its 250 Mgy target.

In October, Algenol Biofuels celebrated the opening of its new state-of-the-art biofuels R&D facility today in Fort Myers. The 40,000 square-foot facility houses an advanced algae biology, engineering, carbon dioxide (CO2) and green chemistry laboratory, as part of the larger Lee Integrated Biorefinery. The facility was made possible with a $10 million incentive grant from the Lee County Board of Commissioners. The facility will house Algenol's advanced biology and engineering laboratories and operations. An adjoining 4-acre outdoor R&D area and 36-acre outdoor commercialization area will hold the company's proprietary photobioreactors—the containers that generate ethanol from algae, saltwater and CO2 using Algenol's patented Direct to Ethanol technology.

Future milestones:

Algenol Biofuels and Dow Chemical will construct a $50 million pilot algae biofuels plant in Freeport. The plant will be located with Dow's existing chemicals complex, and will supply CO2 as well as land for the pilot algae facility. Dow said that it was interested in Algenol's ability to sue algae to produce ethanol, which could be used as a base for making ethylene, which is in turn a feedstock for many types of chemicals.

The plant is designed to produce 100,000 gallons of ethanol per year at a target price of between $1.00 and $1.25 per gallon, according to Woods, who added that groundbreaking is expected to commence in 2010. Traditionally, chemical companies have been using natural gas as an ethylene feedstock. Algenol is among companies competing for a $25 million DOE grant.

Georgia Institute of Technology, the National Renewable Energy Laboratory and the Membrane Technology & Research are partners in the project, which is targeting initial production of up to 140 gallons of algae fuel per day, or 51,000 gallons per year at a yield of 2,120 gallons per acre. The companies are jointly seeking a $25 million DOE loan guarantee.

Metrics:

According to CNN Expansion, Biofields has invested $30 million to date in the project, which is reporting yields of 6900 gallons per acre at its Sonora site. The company is said to be hiring 1500 temporary and 350 permanent workers and commenced construction in December.

Algenol estimates the energy balance, i.e., the ratio of energy out vs. energy in will be greater than 8:1 which compares with 1.35:1 for corn ethanol.

Website:
www.algenol.com

25. Enerkem

Company description:
Enerkem is a leading waste-to-biofuels and chemicals company. It manufactures, owns and operates its community-based plants, which employ its proprietary clean thermo-chemical technology. The technology, developed in-house since 2000, converts residual materials, such as non-recyclable municipal solid waste, into clean transportation fuels and advanced chemicals. The company currently operates two plants in Canada: a pilot facility and a commercial-scale demonstration plant (both in Quebec). Enerkem has also started the construction of its municipal waste-to-biofuels plant in Edmonton, Canada.
The company was recently awarded US$ 50 million in funding from the U.S. Department of Energy for its upcoming waste-to-biofuels plant to be located in Mississippi. Additional projects are under development in North America and abroad. By converting garbage into fuel, Enerkem contributes to a better environment while providing the world with clean energy.

Address:
(Headquarters) 1010 Sherbrooke street West #1610, Montreal, Quebec, H3A 2R7

Year Founded:
2000

Chief Executive Officer
Vincent Chornet

Annual Revenues: Not made public (Private Company)

Major Investors
Enerkem is majority-owned by institutional, clean-technology and industrial investors, including: Rho Ventures, Braemar Energy Ventures, Waste Management, Inc., Cycle Capital and BDR Capital.

Type of Technology(ies):
Thermo-chemical technology (green gasification and catalytic synthesis)

Feedstocks:
Enerkem's process is feedstock-flexible. The company's main feedstock is non-recyclable municipal solid waste. This feedstock is usually procured at a negative-cost, through long-term agreements. The company can also convert other materials such as forest and agricultural residues.

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc)

- Ethanol
- Methanol
- R&D underway (in periphery) to produce Synthetic gasoline (syngas), Synthetic diesel, and Dimethyl Ether (DME)
- Can also produce green chemicals, such as acetates

Fuel Cost (if applicable - per US gallon): *(If you do not manufacture or have long-term stable feedstock pricing, please use the latest December futures contract pricing for traded feedstocks, or $55/ton for untraded biomass – or provide notes on your own feedstock pricing assumptions).*

Sorted municipal solid waste feedstock is usually obtained at a negative-cost. Feedstock is therefore considered a revenue, not a cost.

Offtake partners (if applicable): Enerkem is in discussions with blenders and distributors. In Canada, Enerkem has a business partnership with GreenField Ethanol – Canada's largest grain ethanol producer and distributor (more than 600 million litres of ethanol annually to more than1,500 service stations).

Co-products (if applicable):
N/A

3 Top Milestones for 2009-10

- *Construction (commercial):* Enerkem began construction of its 10 million gallons commercial waste-to-biofuels plant in Edmonton, Alberta (Canada) in August of 2010.
- *Production:* Accumulated more than 1,250 hours of conditioned synthetic gas production since Q2 2009 at its Westbury commercial demonstration facility. Production of methanol at the plant is imminent, followed by ethanol.
- *Funding*: Enerkem, in December 2009, was awarded US$50 million in funding from the U.S. Department of Energy (DOE) for its Mississippi waste-to-biofuels plant. The company also closed a US$51 million round of financing in February 2010.

3 Major Milestone Goals for 2011-13

- Enerkem is scheduled to begin construction of its Mississippi waste-to-biofuels plant (Pontotoc, Mississippi) in Q1 2011. Operations are expected to start in 2012.
- Operations will begin at the Edmonton waste-to-biofuels plant at the end of 2011.
- Enerkem's third industrial-scale commercial plant will be announced and launched.

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

Builder, owner and operator, using its proprietary technology

Competitive Edge(s):

- Advanced stage of development: proven clean technology, being implemented commercially
- Feedstock flexibility: with focus on MSW, under long-term contracts
- Cost-effective plants: based on a standardized packaged-system
- Scalable plant design: with modules of 10 million gallons/36 million litres output per year
- Strong financial backing: from investors and support from governments
- Environmentally-sound process

Distribution, Research, Marketing or Production Partnerships or Alliances. Enerkem is developing relationships with ethanol blenders and distributors as well as chemical groups in the U.S. and Canada. Enerkem has a business partnership with Canada's largest grain ethanol producer and distributor (more than 600 million litres of ethanol annually to more than1,500 service stations)- GreenField Ethanol.
In addition to its plants, Enerkem operates two R&D centers: one in Sherbrooke, QC (Canada) and one in Edmonton, Alberta (Canada).

Stage (Bench, pilot, demonstration, commercial) Demonstration and commercial

Website URL www.enerkem.com

26. Genencor

Company description:
Genencor, a division of Danisco A/S, is a world-leading
enzyme supplier and a pioneer in enzyme innovation and metabolic pathway engineering. Genencor improves processes and product performance and creates new products for a spectrum of industries that includes biofuels, laundry detergents, textiles, animal nutrition, food and beverage. In collaboration with customers, technology leaders, governments, and other stakeholders, Genencor develops and manufactures competitive, biobased solutions. Our technology and innovation create value throughout the supply chain, from raw materials to finished products, while improving the sustainability profiles of industries.

Address:
925 Page Mill Road, Palo Alto, California 94304

Year Founded: 1982

Chief Executive Officer and contact email:

Tjerk de Ruiter

Annual Revenues:

$767 million USD (2009-2010 Annual Report)

Major Investors:

Genencor is a division of Danisco A/S, which has the following tickers and is traded in the following exchanges:

- ecDCO, OMX Nordic Exchange
- DNSOF, Pink OTC Markets
- lL0E3W, London Stock Exchange
- eiDAY, Xetra
- DNSCY, Pink OTC Markets

Type of Technology(ies):

- **Designing and operating cell factories**—14 production sites in the United States, Europe, Asia, South America and Africa to ensure worldwide manufacturing capabilities for large-scale production and delivery of high value enzyme products for global applications.
- **Large scale enzyme manufacturing**—one-step scale-up from lab scale (14 liters) to industrial scale (350,000 liters).

- **Enzyme innovation: discovery, development and application**—3,600 approved or pending patents; over 100 new patents filed each year.
- **Protein and peptide expression**—systems for making virtually any protein or peptide at industrial scale through cost-efficient fermentation and state-of-the-art molecular tools.
- **Protein engineering**—enzyme performance optimized to customer applications.
- **Metabolic pathway engineering**—redesigning microorganisms' pathways to optimize production of proteins and biochemicals.
- **Fermentation, recovery, and formulation**—full capability to develop an efficient process, from fermentor to product, for virtually any application.
- **Supply-chain excellence**—global manufacturing and distribution infrastructure to ensure product quality and on-time delivery worldwide.

Feedstocks:

Genencor develops enzymes and enzymes systems that enable starch as well as a wide range of cellulosic biomass processing to deliver fermentable feedstocks for use in the production of biochemicals and biofuels. Feedstocks may include; corn, wheat, rye, barley, sorghum, triticale and rice. We develop biological systems capable of producing biobased chemicals from a wide assortment of feedstocks including refined sugars from starch and biomass-derived feedstocks.

Fuel Type:

Genencor is a leading supplier to the 12B gallon/year corn ethanol industry, As well, we are supplying enzymes into the growing second generation ethanol marketplace. Finally, we are developing a C5 BioIsoprene™ platform for use in the production of branched chain hydrocarbons, C10 gasoline; C15 biodiesel and jet fuel blend stocks that we collectively refer to as BioIsoFuels™.

A sustainable production system for isoprene is being developed based on microbial fermentation of renewable sugars (BioIsoprene™). Isoprene is an important commodity chemical used in a wide range of industrial applications ranging from the production of synthetic rubber for tires and coatings to use in adhesives and development of specialty elastomers. Current production of isoprene is derived entirely from petrochemical sources. There is an increasing global need for more isoprene and a simultaneous environmental imperative to reduce green house gases, both of which can be achieved by a high efficiency fermentation based process for polymer grade isoprene production. BioIsoprene™ will have broader commercial applications beyond the biochemical uses of isoprene in synthetic rubber, adhesives and specialty elastomers. As a C_5 hydrocarbon, BioIsoprene™ has inherent fuel properties and represents a key biobased intermediate that can be converted to a drop-in transportation fuel additive using chemical catalysis to C_{10} and C_{15} biobased hydrocarbon fuels, thus addressing performance gasoline, jet fuel and biodiesel markets.

Fuel Cost (if applicable - per US gallon):

We believe that BioIsoFuel™ products will be cost competitive with other advanced biofuels. Gas phase recovery of BioIsoprene™ from fermentation of biomass feedstocks enables a cost advantaged process.

Offtake partners (if applicable): (Any partners who have been signed that will become customers for the end-products.)

The first BioIsoprene™-based products to be commercialized will target biochemical applications for use in production of synthetic rubber products, specialty elastomer and adhesive applications. Advanced drop in biofuels derived from BioIsoprene™ (BioIsoFuels™) will follow.

Co-products (if applicable):

BioIsoprene™ monomer.

3 Top Milestones for 2009-10:

- Building off our core competencies of metabolic pathway engineering and biobased processes for chemicals production, Genencor unveiled a breakthrough prototype tire made with BioIsoprene™ technology, as a result of our collaborative research effort with the Goodyear Tire and Rubber Company. Derived from of renewable feedstock, BioIsoprene is expected to deliver a more sustainable alternative to petrochemical-based isoprene, a key component of synthetic rubber. BioIsoprene is a breakthrough biochemical that offers a lower carbon footprint in the manufacture of synthetic rubber and the potential for various other applications, such as specialty elastomers, adhesives and advanced biobased transportation and jet fuels which will be derived from the BioIsoprene™ C5 building block. .

- The launch of Accellerase® DUET, the latest generation in Genencor's line of enzymes that converts biomass into sugars – earning the Frost & Sullivan New Product Innovation Award for Enzymes for Biofuel Production and the American Institute of Chemical Engineers Sustainable Energy Award. Accellerase® DUET builds on the advances in beta-glucosidase and cellulase activity previously made by its predecessor, Accellerase® 1500. These improvements allow Accellerase® DUET to achieve higher sugar and biofuel yields, often at three-fold lower dosing, and to be feedstock- and pretreatment- flexible. Employing a whole broth formulation, Accellerase® DUET provides nutrients for fermentative organisms and lowers the chemical load introduced into our customers' processes. Higher performance at lower dose will lead to significant improvements in enzyme cost in use for producers, which is critical to enable the cellulosic biofuels industry.

- Genencor's launch of SPEZYME® Robust Starch Liquefaction, which improves liquefaction and requires no pH adjustment, reduces production costs and increases ethanol yield. Unlike the conventional liquefaction enzymes, Genencor's SPEZYME® RSL breaks down starch efficiently across a range of pH levels, substantially reducing the amount of sulfuric acid that is required to complete the liquefaction process. In addition, while the current practice typically requires two pH adjustments and two enzyme doses, SPEZYME® RSL is effective with just one dose and no pH adjustment. Though results may vary, many ethanol producers can expect a 25 to 50 percent reduction in sulfuric acid usage.

3 Major Milestone Goals for 2011-13:

1. Continuing launch of high performance enzyme products that dramatically lower cost in use to enable the cellulosic biofuels industry.
2. Launching several new enzymes to reduce chemical costs, water and energy use in the production of 1st generation biofuels.
3. BioIsoprene™ C5 Platform: Genencor builds relationships to enable further pilot and commercial development of BioIsoprene™ and BioIsoFuels™, branched chain hydrocarbon advanced Biofuels.

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

- Merchant enzyme supplier to ethanol/Biofuel industry
- Integrated solutions provider in cellulosic Ethanol industry through Dupont Danisco Cellulosic Ethanol Joint Venture
- Developer/ Owner / Operator of BioIsoprene™ C5 platform for biochemicals and biofuels.

Competitive Edge(s):

Genencor has large-scale, global manufacturing capabilities, with a total of 14 production sites in the United States, Europe, Asia, South America and Africa that ensure product quality and on-time delivery worldwide. In addition to our established production infrastructure, we have four R&D centers in the North America, Europe and China where we collaborate with our customers to offer flexible and timely innovations to address their business needs.

Genencor is actively working to enable and deliver biorefinery commercial successes today! Be it starch ethanol, cellulosic ethanol, other biofuels or even renewable biochemicals, Genencor is one of the few industrial biotech companies that offers everything from discovery to delivery of new enzymes and products. We have a strong IP portfolio, global production capability and economies of scale that few other companies can challenge. Our innovation continues with world class R&D efforts to deliver dislocating products at cost structures that are relevant for the biofuels and renewable biochemicals markets. While many people have good stories in this area, Genencor is a leading innovator and is delivering today.

Distribution, Research, Marketing or Production Partnerships or Alliances:

Genencor partners with approximately 50 universities to conduct ongoing research and has collaborations with Goodyear and Inbicon and a joint venture with DuPont (DDCE).

Stage (Bench, pilot, demonstration, commercial):

- Our Starch to Ethanol Enzymes are of course at commercial scale. We know this business well, but continue to launch innovative new products to support this industry as it continues to grow.
- Our Cellulosic Enzymes (Accellerase®) are also produced at commercial scale. We are currently supplying enzymes at bulk scale to cellulosic ethanol pilot and demo plants.
- Our BioIsoprene™ monomer efforts are at a pre-pilot stage. We expect to be able to make pilot plant investment decisions in a 2011 timeframe.

Website URL: www.genencor.com

27. Shell

Based in: Netherlands

Business:
Oil & gas exploration, production, refining and marketing; biofuels investments in Codexis, Cellana, Virent and Iogen.

Model:
Owner-operator, investor.

Past milestones:

In Scotland, the Glenturret Distillery in Perthshire announced that it would convert waste CO2 to biodiesel by growing algae as a biofuel feedstock. Scottish Bioenergy confirmed in a BBC report that it had constructed the first pilot-scale algae bioreactor at Perthshire in cooperation with the distillery, Shell, Edrington Group and the Scottish Environmental Technology Network.

In Canada, a Shell station in Ottawa became the first in the country to serve cars with cellulosic ethanol, offering a 10 percent blend of gasoline and wheat straw ethanol manufactured at a demonstration-scale cellulosic ethanol plan jointly owned by Shell and Iogen.

Last October, Iogen announced that it had commenced shipments of a 47,000 gallon cellulosic ethanol order from venture partner Royal Dutch Shell. The companies first partnered in cellulosic ethanol in 2002 when Shell invested in Iogen. Shell subsequently increased its ownership stake in Iogen's technology to 50 percent in 2007.

The company recently expanded an agreement with Codexis to accelerate the arrival of next-gen fuels.

Shell and its biofuels babies

Iogen
Iogen Energy is currently operating its Ottawa demonstration plant on a continuous basis using the proven R7 technology release. Over the last 12 months, Iogen Energy has produced more than 170,000 gallons of cellulosic ethanol from wheat straw using its R7 technology. Shell's additional funding will be used to develop and demonstrate Iogen Energy's next two major technology releases, R8 and R9, which will significantly reduce the capital and operating costs per gallon of cellulosic ethanol. Iogen Energy, a 50-50 joint

venture between Shell and Iogen Corporation has been producing cellulosic ethanol from wheat straw at its Ottawa demonstration plant since 2004.

Digest's take: Something's missing in Iogen's ROI picture, else scale-up would already have happened. Our estimate is that the operating costs are fine, else the project would have been shelved. The problem appears to lie in amortizing the capital costs, which has seen Iogen acquire a laser-like focus on organizing effective public sector support. If the US or Canadian governments announce a major revision in loan guarantees and/or investment tax credits, look for an early announcement from Iogen on moving to commercial scale.

Virent

In March, Virent and Shell announced the successful startup of the Virent "Eagle" demonstration plant, producing 10,000 gallons per year of biogasoline, a drop-in renewable fuel.

This morning, Shell announced that it has taken an equity stake in Virent and begun a joint technology program.

In total, Virent closed a $46.4 million third round of funding in which Shell and Cargill deepened their commitment to Virent's technology platform. The investment agreement also expands an existing research and development collaboration with Shell for the production of biogasoline to include diesel fuel. With its new equity stake, Shell will also have a seat on Virent's board.

The financing follows a March 2010 milestone in which Virent announced the successful start-up of the world's first biogasoline production plant. The Virent demonstration plant can generate more than 10,000 gallons per year of premium biogasoline product and increases confidence in the commercial viability of the technology.

The "Eagle" project represents a 100X scaleup from the company's previous bench level, and utilizes sugars derived from biomass, passed over over catalytic process, similar to oil refinery. Virent CEO Lee Edwards said that the company is using primarily sugarbeet sugar, and has tested cane, corn in the pilot plant as well; at bench level, the company has also tested sugars from non-food biomass.

"This investment demonstrates Shell's confidence in Virent's catalytic biofuel production processes,'' said Luis Scoffone, Vice President of Alternative Energies at Shell. ''The expansion of our joint technology programme to include research into the production of diesel from plant sugars offers considerable potential and complements Shell's wider biofuels portfolio.''

"Virent is proud to deepen our strategic relationship with Shell with their equity investment and expanded research collaboration", said Lee Edwards, Virent president and CEO. "Shell is a global industry leader who adds resources and expertise to our research and scale-up plans, which now include research to convert plant sugars directly into diesel fuel."

"Virent has a competitive advantage from our strong relationships with two premier, global companies, Shell and Cargill. Their significant capabilities and expertise across the value chain will be essential to accelerating deployment of Virent's BioForming technology at commercial scale," said Lee Edwards, Virent president and CEO. "I am especially gratified that our accomplishments to date have resulted in a $46.4 million funding round, which is well above our initial $25-40 million objective."

Digest's take: Shell's equity stake says just about everything. Cargill's increased investment says the rest. Demonstration scale data is just coming in now; but if Virent goes to 1 Mgy, it will go far.

Cosan

Ethanol giant Cosan, whose assets were recently tied up in a $12 billion venture with Royal Dutch Shell, reported $2.35 billion in Q1 2010 revenues, up 87 percent over Q1 2009. Overall, the group reported a 139 percent increase in sugar revenues after world prices hit new highs in the wake of Indian sugar crop failures.

Digest's take: Shell isn't in Brazil for the joys of the sugar business, not ultimately as solely a renewables play in the ethanol space. Ethanol is an affordable, sustainable route to increasing domination of an important fuel market (Brazil), with tempting M&A economics caused by huge debt loads in the sugar/ethanol sector.

Cellana

Royal Dutch Shell and HR Biopetroleum created a joint venture in December 2007, called Cellana, to construct an algae-oil production facility to produce feedstocks for biodiesel.

Digest's take: A remarkably quiet development given the hoopla over algae, and Digest sources say that there's tension between Cellana management and Shell over Shell's approach to "helping" the design process.

Codexis

In April, Codexis (CDXS) raised $78 million in its IPO, selling 6 million shares at $13 each. The $13 price was at the bottom end of the $13-$15 range targeted by the company and gives the company a $509 million market capitalization. The company posted a $20 million loss in 2009, on revenues of $83 million, eight years after its original 2002 spin-off from Maxygen (MAXY).

Digest's take: The first renewables investment by an oil major in some time to manage an IPO, so definitely chalk this one as a winner, though a disquieting post IPO downward shift to sub-$10 pricing is noted.

The bottom line

"You are up against, to give an example, a $400 million internal upgrade to an off-shore platform that is using known technology to produce a known return, for the production of oil and gas that the company is entirely comfortable with," an industry executive recently told the Digest, requesting confidentiality. "Even if you pass through that, investment is on a stage-gate process, and they are really, really serious about internal controls and hurdles. "

Future milestones:

Commercialization of one or more of the company's investments in cellulosic ethanol, algae biofuels or renewable diesel.

Metrics:

Shell Oil CEO Jeroen van der Veer said that biofuels will account for 7-10 percent of global fuel supply "over the next few decades". It expects to market "commercial volumes" of next generation biofuels within the next 5-10 years.

28. Ceres

Based in:
1535 Rancho Conejo Blvd., Thousand Oaks, CA 91320

Founded:
1996

Annual revenues:
N/D

Type of technology:
Gene Marker-Assisted plant breeding, biotechnology and other genonmics

Fuel Type:
Biomass is the common denominator to advanced biofuels, biopower and bioproducts and is independent of the end-fuel molecule.

Major investors:
Warburg Pincus, Warburg Pincus, Soros Private Equity Partners , GIMV, Oppenheimer.

Past milestones:

Launched commercial seed brand Blade Energy Crops, announced partnerships with leading biofuel and biopower companies.

Established world's largest energy crop trialing network.

In August, Ceres has opened a subsidiary to provide sweet sorghum for ethanol production. The company said that it is currently working with multiple ethanol mills, technology providers and equipment companies to facilitate the introduction of sweet sorghum hybrids into existing ethanol mills.

In July, Ceres announced today that it has completed a private offering of convertible preferred stock. The proceeds will be used, in part, to expand the company's research and commercialization activities in the advanced biofuels and biomass-to-power markets. The financing round was led by Artal Luxembourg and Ambergate Trust, and included European investment company Gimv, among others. Other aspects of the offering and its participants were not disclosed. Ceres currently markets improved seed varieties of switchgrass and high-biomass sorghum under its Blade Energy Crops brand, has additional research programs in sweet sorghum and miscanthus, and holds one of the world's largest proprietary collections of fully sequenced plant genes.

Ceres announced in July that it had developed a plant trait that could bring new life to millions of acres of abandoned or marginal cropland damaged by salts. Results in several crops, including switchgrass, have shown levels of salt tolerance not seen before. Ceres reported that its researchers tested the effects of very high salt concentrations and also seawater from the Pacific Ocean, which contains mixtures of salts in high-concentration, on improved energy grass varieties growing in its California greenhouses. According to Ceres, there are more than one billion acres of abandoned cropland globally that could benefit from this trait and others in Ceres' pipeline, including 15 million acres of salt-affected soils in the U.S. The company now plans to evaluate energy crops with its proprietary salt-tolerant trait at field scale.

Future milestones:

Ongoing commercial sales and scale-up in pace with industry.

Business model:
Seed sales and trait licenses

Fuel cost (per gallons)
Yields per acre is one of the single largest levers against feedstock costs, which typically represents 50% of the cost of the finished product.

Competitive edge:
Genetics, Intellectual Property, Early Mover Advantage

Distribution, research, marketing or production partnerships or alliances.
R&D: Texas A&M (leading sorghum genetics), Samuel Noble Foundation (Switchgrass genetics) and other unannounced alliances in miscanthus.

Development stage:
Commercial

URL: www.ceres.net and www.bladeenergy.com

29. ExxonMobil

Based in:
New Jersey

Founded:
1912

Annual revenues:
N/D

Type of technology:
Algal-based and cyanobacteria-based biofuels

Fuel Type:
Refiner/distributor of petroleum-based fuels.

Major investors:
Trades as XO

Past milestones:
Announced $600M research project with Synthetic Genomics in 2009.

Future milestones:
N/D

Business model:
Owner-operator

Fuel cost (per gallons)
N/D

Competitive edge:
N/D

Distribution, research, marketing or production partnerships or alliances.
Synthetic Genomics

Development stage:
Research

URL: www.exxonmobil.com

30. Cobalt Technologies

Company description:

Cobalt Technologies is commercializing cellulosic biobutanol, a versatile platform molecule for the renewable and profitable replacement of petrochemicals and petroleum. The Company's technology efficiently converts diverse non-food feedstocks – initially, hemicellulose extracts from woody biomass and sugar cane bagasse – into biobutanol. Cobalt will offer complete systems for biomass power facilities and retrofitting pulp and paper plants with a cost-effective biorefinery module, taking advantage of benefits of co-location (feedstock supply, logistics, permits) while enhancing overall facility returns. Feedstock for the biorefinery will be low-value hemicellulose extracted from woody biomass (or bagasse) that otherwise would be burned for energy.

Biobutanol can be used as is in paints, coatings and other chemical products, a 1.2 billion gallon, $6 billion market. It can also be converted via known chemistry into a wide range of high value products, including 1-butene, isobutene and butyraledehyde derivatives, replacing petrochemicals and accessing a 67 billion gallon, $300 billion market, and full performance jet fuel and diesel. Biobutanol can also be blended with gasoline, diesel and ethanol to reduce emissions.

Engineered to achieve low costs through high productivity, energy efficiency and the use of low-cost feedstock, Cobalt is making biobutanol and its derivatives a cost effective substitute to petroleum-based materials.

Address:
500 Clyde Avenue
Mountain View, CA 94043

Year Founded:
2006

Chief Executive Officer:
Rick Wilson

Annual Revenues:
pre-revenue

Major Investors:
Pinnacle Ventures
Vantage Point Venture Partners
Malaysian Life Sciences Capital Fund
Life Sciences Partners (LSP)

@Ventures
Burrill and Company

Type of Technology(ies)

- Hemicellulose extraction and conditioning, depending upon particular feedstock
- Development of high performing organisms via proprietary techniques
- Accelerated fermentation in patent-pending bioreactor system
- Standard distillation technology optimized for unique attributes of Cobalt process

Feedstocks:
Hemicellulose extracts from woody biomass in connection with pulp and paper or biomass power operations, sugar cane bagasse, and energy crops

Fuel Type:
Biobutanol

Fuel Cost (if applicable - per US gallon): $1.71 per gallon, assuming $55 / ton of feedstock.

We believe that a more appropriate feedstock cost would be significantly below $55/ton, due to the applications we are targeting – biomass power plants and pulp and paper facilities. In these applications, the alternative use of hemicellulose in the applications we are targeting is combustion for power. At $35 / ton our cost of production is 1.29 per gallon.

Offtake partners (if applicable)

Co-products (if applicable)
Acetone

3 Top Milestones for 2009-10
- Pilot plant opening in Mountain View
- 1st to convert beetle kill wood into butanol, followed by successful engine testing
- Partnership with Fluor Corp
- Production of on-spec jet fuel from n-butanol
- Cobalt Technologies announced a partnership with the U.S. Navy to develop technology for the conversion of biobutanol into full performance jet and diesel fuels. Under the agreement, n-biobutanol produced by Cobalt will be converted to bio-jet and biodiesel fuels using technology developed at the U.S. Naval Air Warfare Center Weapons Division (NAWCWD) in China Lake, CA. More specifically, the combined team will optimize dehydration chemistry for the conversion of bio-n-butanol to 1-butene, followed by oligomerization of the biobutene into jet fuel, based on a process developed at NAWCWD.

Additional work will focus on converting the biobutanol into butyl ether, which the NAWCWD has shown can be mixed with n-butanol and other compounds to create a viable drop-in diesel fuel replacement. In addition, Cobalt will have an option to obtain an exclusive license to commercialize process improvements, made under the CRADA, for the production of all military and civilian transportation fuels.

3 Major Milestone Goals for 2011-13

- Construction and operation of demo-scale facility (2011)
- Licensing and royalty revenue from first commercial plant
- Execution of strategic partnerships for feedstock supply and product offtake

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor). Technology licensor with equity participation where required for financing (i.e, first small commercial plant) and as balance sheet permits.

Competitive Edge(s):

- Proprietary assays for development and selection of high performance non-GMO organisms
- Ability of proprietary organism to convert C5 sugars to solvent, which creates opportunities to use low cost feedstock. Cobalt's process upgrades hemicellulose extracts from low value uses (primarily combustion) to high value uses (solvents)
- Bioreactor design that enables high levels of productivity (keeping capital costs low)
- Energy-efficient distillation process
- High value product (butanol price in chemical market is $5.50 per gallon)

Distribution, Research, Marketing or Production Partnerships or Alliances:
Colorado State University
Fluor Corporation
US Navy

Stage (Bench, pilot, demonstration, commercial)
Pilot, currently designing demonstration.

Website URL: www.cobalttech.com

31. Aurora Algae

Based in:
1201 Harbor Bay Parkway, Alameda, CA 94502

Business:
Aurora burst onto the scene in June 2008 with the announcement that it had raised $20 million in series A financing from Oak Investment Partners, Noventi and Gabriel Venture Partners. Gabriel and Noventi had participated in a seed stage round. Aurora plans to use technology developed by Berkeley professor Tasios Melis for an open-pond algae production system, and will produce biodiesel from algae. The company says that its process reduces the cost of biodiesel production by half, compared to current methods.

Model:
Owner-operator

Past milestones:
AlwaysOn named Aurora Biofuels in the AlwaysOn 100.

The company completed an 18-month pilot in early 2009, and VC backer Jim Long of Gabriel Venture Partners recently told a group of biofuels execs at Biofuels: Science and Innovation that algae was "the focus" at GVP as far as biofuels.

In California, Aurora Biofuels announced that it has succeeded in optimizing its base algae strains to more than double CO2 consumption and fuel production, and has proven these results in an outdoor open system over the last several months. The company said that it has developed a proprietary process which allows for the superior selection and breeding of non-transgenic algae.

Aurora Biofuels investors include Oak Investment Partners, Noventi Ventures and Gabriel Venture Partners.

Aurora has made breakthroughs in extracting oil from algae without passing through a drying stage, bypassing the most expensive and energy-intensive part of the algae production process.

In October, Aurora Algae announced the company is expanding operations with the opening of a new regional headquarters in Perth, Australia. The new office, to be led by Australian Managing Director and Aurora Algae Co-Founder Matthew Caspari, will oversee the construction and operation of Aurora Algae’s first commercial-scale facility in the Northwest region of the country. In Q3, the company announced an expansion of their product portfolio to include renewable fuels, high concentration Omega-3 fatty acids, high-density proteins and fish feed.

In September, the company formerly known as Aurora Biofuels has confirmed its emergence as Aurora Algae, as previously reported in the Digest. The company also said that it is now trasitioning from a pilot technology development to full-scale commercialization of the Company's proprietary algae products, including high concentration eicosapentaenoic acid (EPA Omega-3 fatty acids), high-density proteins, fish meal and renewable fuels.

The company's key technology – an optimized strain of salt-water algae that is lighter in color than wild-type algae, allowing deeper penetration of sunlight, thereby extending the zone for algae reproduction and increasing yield. The company said it has also adapted a technique used in the waste-water industry for low-cost algal harvesting.

Future milestones:
Aurora is "highly confident" that it will reach targets of 6,000 gallon per acre yields and a cost of $1.30 per gallon" of algal fuel "at the gate", in its second generation of evolution.

The company has raised $20 million which will carry it through the completion of a demo-scale 10-20 acre pond system by 2010.

Metrics:
Aurora leapt into the news this spring with a projected $1.30 cost for algae in its second-generation technology, due in 2013.

Website:
www.aurorabiofuels.com

32. Joule Unlimited

Company description:
Joule is pioneering the production of *Liquid Fuel from the Sun™*, surpassing today's barriers to abundant, sustainable, cost-competitive supply. Its transformational *Helioculture™* platform converts sunlight and waste CO_2 directly into liquid fuels in a continuous process that is not limited by costly biomass intermediates, processing or use of precious natural resources. This platform can yield renewable diesel fuel in unprecedented volumes with a fraction of the land use incurred by current methods, leapfrogging biomass-dependent approaches and eliminating the economic and environmental disadvantages of fossil fuels.

Address:
83 Rogers Street, Cambridge, Mass, 02142

Year Founded:
2007

Chief Executive Officer:
Bill Sims

Annual Revenues:
NA

Major Investors

Flagship Ventures, private, and institutional investors.

Type of Technology(ies)

Joule's *Helioculture™* technology platform combines breakthroughs in genome engineering, bioprocessing and integrated systems engineering to capture sunlight and convert waste CO_2 directly into fungible fuels and chemicals in a single-step, continuous process.

Feedstocks:

Sunlight and waste CO_2

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc)

Diesel (hydrocarbons) and ethanol

Fuel Cost (if applicable - per US gallon):
At full-scale commercial production, we project our costs (including capital) to be as low as $30/bble for diesel and $50/bble for ethanol.

Offtake partners (if applicable)

Co-products (if applicable)

We have achieved proof of concept for a number of value added chemicals that are conventionally derived from petroleum.

3 Top Milestones for 2009--2010

- Built pilot plant in Leander, TX and commenced operations
- Achieved direct production of diesel molecules, and was awarded a key U.S. patent covering the process
- Successfully closed a $30M second round of funding, supporting a world-class team of business and science professionals and advisors

3 Major Milestone Goals for 2011--13

- Build out first commercial facility, beginning with 10-acre demo plant and leading to rapid scale-up and first revenues, also to include global deployment
- Implement next-generation *SolarConverter*® system for optimized efficiency and productivity, Continue optimization of production strains to achieve productivity and cost targets
- Form strategic partnership/s for commercialization of ethanol and/or chemicals to be deployed around the world

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

Joule intends to commercially develop diesel fuel, and bring ethanol and chemicals to market via strategic partnerships. Joule will also provide *SolarConverter*® hardware, technology and deployment know-how transfer and controlled access to production strains.

Competitive Edge(s):

- Proven conversion of sunlight and waste CO_2 into multiple products: diesel (hydrocarbons), ethanol and value-added chemicals
- No dependence on raw material feedstocks or costly processing/logistics
- An integrated system up to 50X more efficient than biofuel processes
- Productivity up to 15,000 gal diesel/acre/year and 25,000 gal ethanol/acre/year
- Costs (including capital) as low as $30/bble of diesel and $50/bble of ethanol

- Fully modular and scalable to billions of gallons with comparatively minimal land use
- Ecologically-sound process doesn't require arable land or fresh water, and produces 9X more energy than it consumes
- Strong IP position with 2 patents granted and 120+ applications filed
- World-class team of biologists, biochemists, engineers, industrial experts and executive leadership

Distribution, Research, Marketing or Production Partnerships or Alliances.

NA

Stage (Bench, pilot, demonstration, commercial)

Pilot

Website URL

www.jouleunlimited.com

33. Syngenta

Based in:
Schwarzwaldallee 215, CH-4058 Basel, Switzerland

Year Founded:
2000

Annual Revenues:
(2007-08) $11.6 bn, $9.2 bn

Technology:
Agronomics and Enzymes

Fuel type:
NA

Major investors: 100% publicly quoted company

Past milestones:
Introduction of novel sugarcane planting methodology for improved sugarcane cultivation, harvest and yield under brand name Plene™; Conducted full-scale commercial trials for Corn Amylase in 2008-2009; Further developed the use of tropical sugar beet in tropical regions with poor soil conditions, making particular progress in Colombia

Future milestones:

Commercial launch of Plene™ by end-2010

Business model:
Licensing of agronomic technology

Fuel cost:
NA

Competitive edge:
Excellent biotech competence in expressing enzymes in plants, and developing high yield varieties of corn and cane through enhanced germplasm, strong global R&D presence, and ability to integrate seeds and crop protection solutions

Distribution, research, marketing or production partnerships or alliances:
Partnership in Brazil with equipment manufacturers and millers for the novel cane planting methodology, variety of partnerships with ethanol producers in the USA for pilot

test programs of Corn Amylase, multiple collaborations (public and private) aimed at stretching and improving our technological capabilities

Development stage:
Currently at pilot and demonstration stages of both Plene™ and Corn Amylase

URL:
www.syngenta.com

34. KL Energy

Based in:

306 East Saint Joseph Street Suite 200, Rapid City, SD 57701

Year Founded:

2003

Annual Revenues: – N/A

Technology Type:
Thermal Mechanical

Fuel type:
Cellulosic ethanol, lignin (including use as a high energy lignin pellet)

Major investors:
Various strategic non-institutional investors.

Past milestones:

a) Moving beyond our pilot plant to the opening in 2008 of the first USA based 2nd generation commercial scale demonstration plant producing cellulosic ethanol and high energy lignin and protein based co-products from forestry waste.
b) Development of a commercially viable, "shovel-ready" technology, based on an environmentally friendly thermal -mechanical pretreatment and enzymatic hydrolysis process that works with various non-food feedstocks, including several types of woody biomass and bagasse. KL Energy has achieved or exceeded established industry benchmarks.
c) Becoming a listed company and obtaining substantial investor funding over the last 14 months in an extremely difficult market, providing sufficient capital for development of technology into a commercially viable business model.

In August, KL Energy and Petrobras announced that they have entered into a Joint Development Agreement to jointly optimize KLE's proprietary cellulosic ethanol process technology for sugarcane bagasse feedstock. As part of this agreement, The companies also said that they will develop a 4 Mgy bagasse-based cellulosic ethanol project that will be co-located with a Petrobras-owned sugarcane mill, which will come online in 2013.

In addition, Petrobras will provide $11 million to adapt KLE's demonstration facility to the use of bagasse, validate the optimized process by producing cellulosic ethanol and lignin and license the validated technology.
The agreement has an initial term of 18 months and provides for mutual exclusivity in the area of developing cellulosic ethanol from bagasse. The latest generation of KLE's process

design provides for substantial enhancements over the first generation, implemented in 2008 at the company's demonstration plant in Upton, Wyoming using Ponderosa Pine feedstock, including the ability to be optimized for multiple feedstocks.

Future Milestones:

a) Commissioning and start-up of at least 5 currently identified cellulosic based energy projects with 100,000 to 200,000 metric ton processing capacity, over 3 continents by the middle of 2012.
b) Identifying and beginning construction on a minimum of 5 additional 100,000 to 200,000 metric ton cellulosic based energy projects by the end of 2013.
c) Formalizing national and international strategic partnerships and alliances that accelerate the commercialization of KLE technology, while proving and retaining a competitive edge in the industry.

Business model:
Owner-operator and licensor-partner.

Fuel cost:
Between $1.25 and $1.50 per gallon, before any federal or local incentives.

Competitive edge:
a. KLE's technology is commercially viable today before the positive effects of federal and local incentives.
b. KLE's commercially viable technology is capacity flexible, providing scalable, custom designed CBE plants tailored to the feedstock availability and the local market. Locating CBE's near feedstock significantly reduces transportation costs.
c. KLE's technology preserves the value of the co-products, resulting in optimum economic usage of the feedstock.
d. The co-products from the KLE technology, primarily lignin, have various valuable uses due to its high Btu content, including as a high energy lignin pellet.
e. KLE's technology does not include gasification or substantive amounts of acid, resulting in lower capital costs, lower operating costs, and minimum fermentation toxicity, low water usage, resulting in an environmentally friendly process.
f. KLE's technology results in high slurry concentrations, well above NREL heat material balance assumptions, resulting in substantially lower capital costs and operating costs.
g. KLE's technology, while feedstock flexible, is very effective on various woody biomass and bagasse, feedstock available in plentiful supply in key markets throughout the world. The effective management of forests requires the management of woody biomass.
h. KLE's alliances with investor partners provide valuable opportunities for future growth.
i. KLE's experience with designing and operating highly efficient first generation ethanol plants provides significant competitive advantages for the implementation of KLE's commercially viable technology.

j. As a result of lower capital costs, lower operating costs, and the valuable co-products, KLE is able to profitably scale down capacity levels substantially below competitors to serve specific local markets for feedstock and off-put products.
k. KLE's investor partners, including those in the energy industry, are not a limiting factor in the direction and scope of the company's future operations and opportunities.

Alliances and Partnerships:
KLE is in the process of formalizing several strategic alliances and partnerships. KLE's investor partners' experience and relationships in the energy industry have opened several opportunities for CBE projects, research and development, and distribution of ethanol and co-products, both nationally and internationally. Convinced by the results of KLE's commercial scale demonstration plant, several 2nd generation enzyme and yeast producers partner with KLE for their testing on a commercial scale.

Development stage
KL Energy Corporation's technology is commercially viable today, even before the substantial government incentives available.

Metrics: The commissioning and start-up of 10 profitable CBE plants by 2013.

Website: –www.klenergycorp.com .

Quotable- "From the beginning, we have focused on developing clean technology based on the economics of ethanol and high energy lignin by-products, including lignin pellets, from non-food feedstock. This focus has allowed us to become the first technology and commercially viable 2nd generation bio-fuel company that is ready to build profitable CBE's today".

"With our international investor partners and licensing agreements, we are able to rapidly implement our profitable business model throughout the world."

35. Codexis

Company description:
Codexis serves major worldwide markets where clean technology can make a positive economic and environmental impact. Our focus is on the cost-effective conversion of renewable resources into transportation fuels and pharmaceuticals, and on the development of new technologies for effective air and water treatment and chemical manufacturing.

Address:
200 Penobscot Dr, Redwood City, CA 94063

Year Founded:
2002

Chief Executive Officer:
Alan Shaw, Ph.D

Annual Revenues:
2009: $83 million
Estimated fiscal 2010: $94-98 million

Major Investors:
Nasdaq: CDXS; IPO April 22, 2010

Type of Technology(ies):
Codexis' platform is based on proprietary directed evolution biocatalysis technology. Codexis manufactures industrial biocatalysts for use in creating faster, more efficient and environmentally-friendly manufacturing processes and industrial scale in the bioindustrials and pharmaceuticals markets.

Feedstocks:
Codexis technology is feedstock agnostic. It has the potential to be used on feedstocks including cellulosic biomass including sugarcane begasse, grasses and straw

Fuel Type:

Cellulosic ethanol, via newly developed commercial yeast capable of rapidly producing high levels of ethanol from cellulose-derived sugars

Biohydrocarbon diesel, via converting cellulose derived sugar into fungible diesel blending stock

Fuel Cost (if applicable - per US gallon):
Not yet determined

Offtake partners (if applicable)
Biofuels: Shell, in conjunction with a joint venture being formed between Shell and Cosan (Brazil)

Co-products (if applicable)

3 Top Milestones for 2009-2010

1. Feb. 1, 2010; Shell Cosan biofuels JV, Brazil, announced (MOU; final agreements announced August 25)
2. April 22, 2010: successfully completed IPO, raising $78 million
3. June 21, 2010: received second EPA Presidential Green Chemistry Award; awards are given for industrial products intended to reduce pollution

3 Major Milestone Goals for 2011-13

1. Continue success in biofuels development program with Shell
2. Continue expansion into carbon capture market including forming development and marketing partnership (initial data announced July 13, 2010)
3. Continue building a sustainable company and generating shareholder value

Business Model:
Codexis develops optimized biocatalysts that make existing industrial processes faster, cleaner and more efficient and potentially can be used to make new industrial possible at commercial scale. Codexis biocatalysts have been commercialized in the pharmaceutical industry on therapeutics for diabetes and high cholesterol, among others. The company is developing biocatalysts for use in producing advanced biofuels in collaboration with Shell, and for use in carbon capture from coal fired power plants (these plants currently generate approximately half the energy in the United States). Future markets include clean chemical manufacturing and water treatment.

Competitive Edge(s):
Codexis' competitive edge is our proprietary leverageable technology platform which is commercially successful in creating differentiated solutions for pharmaceutical, biofuels, and chemical production and carbon capture. Our approach allows us to develop solutions designed for the optimal process, not to be limited to what nature provides

Codexis biofuels program focuses on:
l) developing biocatalysts to convert cellulosic biomass into sugar
--increasing the rate at which cellulosic biomass is converted into biofuels

--increasing the yield of biofuels produced from cellulosic biomass
--eliminating the need for food to be used in production of biofuels
--and, by these improvements, reducing the cost of building and operating biofuels plants
2) converting these sugars into two advanced biofuels, cellulosic ethanol and biohydrocarbon diesel
--developing a biocatalyst to convert sugars to diesel fuel
-- improving ethanol-producing yeast

Distribution, Research, Marketing or Production Partnerships or Alliances.
Pharmaceuticals: Customer base includes Merck, Pfizer, Teva for clean technology drug manufacturing methods that improve efficiency and reduce toxic waste
Biofuels: Shell and Shell/Cosan when completed

Stage (Bench, pilot, demonstration, commercial)
Bench/Pilot development

Website URL: www.codexis.com

36. IneosBio

Based in:

3030 Warrenville Rd., Suite 650, Lisle, IL 60532

Year Founded:

August 1984. The company was renamed INEOS Bio after the acquisition by the INEOS Group of Bioengineering Resources Inc. (BRI) in July 2008.

Annual Revenues:
< $1m

Technology type:

The INEOS Bio process is a combined thermochemical and biochemical technology for ethanol and power production. It is comprised of four main steps: (1) feedstock gasification, (2) synthesis gas fermentation (3) ethanol recovery and (4) power generation. The process utilizes a patented fermentation process, where cleaned, cooled synthesis gas is converted selectively into ethanol by a naturally occurring anaerobic bacteria. The process has been under development for 18 years.

Fuel type:
Bio-ethanol & Renewable Power

Major investors:
INEOS, the third largest chemical company in the world, is the sole owner of the company and technology.

Past milestones:

1. Complete the basic engineering and design package for the first demonstration of the technology in a commercial-scale unit.
2. Continue testing of additional sustainable feedstocks in the pilot plant. The feedstocks successfully tested include: wood waste, MSW, sugar cane bagasse, corn stover, and auto shredder residue.
3. Continued successful pilot plant testing to support the engineering design. The pilot plant has been in operation for 6 years (2003-2009). The unit is now generating emissions data in support of permitting of the first commercial-scale unit.

In November, INEOS New Planet BioEnergy has awarded the EPC contract to build its 8 million gallon per year advanced bioenergy facility in Vero Beach to AMEC of Tucker, GA. The facility will also produce up to 6 MW of renewable power from municipal solid waste and yard and wood residues, enough to power more than 4,000 residences.

INEOS New Planet BioEnergy is a joint venture between INEOS Bio and New Planet Energy, which received a $50 million grant from the DOE last year towards construction of the INEOS New Planet demonstration plant.

The heart of the INEOS Bio technology is a patented anaerobic fermentation step, through which naturally occurring bacteria convert gases derived directly from biomass into ethanol. The INEOS Bio process can produce ethanol and renewable energy from numerous feedstocks, including construction waste and municipal solid waste, forestry and agricultural waste.

In June, INEOS Bio received a $10.8 million in grants from the Department for Energy and Climate Change and the Regional Development Agency One North East towards the construction costs of its waste-to-ethanol BioEnergy Process Technology project at the INEOS Seal Sands site in the Tees Valley. The 7.9 Mgy (30 million liter) project will also produce 3 MW of renewable power and will be completed in 2012. The plant which will utilize 100,000 tonnes of municipal solid waste (which it will convert at a 25 percent yield) will create 40 permanent and 350 construction jobs, and will become the base of a larger commercial INEOS Bio plant that will open in 2015.

Future milestones:

1. Issue the EPC bid package for the first 8myg/yr commercial-scale unit.

Begin construction in 1Q 2010.

2. Execute additional licenses with licensees in the Americas and Europe.
3. Commission and startup the first commercial unit in 3Q 2011.

Business model:

INEOS Bio will be an owner/operator of the first commercial-scale plant via a joint venture with New Planet Energy. INEOS Technologies (also part of the INEOS Group) is the leading licensor of chemical process technology in the world. INEOS Bio will adopt a similar business model to Technologies and it expects to monetize the technology through owner projects, joint ventures and licensing of the technology. This approach will leverage the skills, experience and resources of INEOS and its Technologies business.

Fuel cost:

With a zero or negative cost feedstock, we forecast the ability to produce for $1.00 per gallon (or less).

Competitive edge:

INEOS Bio is uniquely positioned to commercialize this next generation technology. We have an experienced team of engineers, scientists, IP Legal, business development, logistics, and marketing professionals who have developed and commercialized new chemical process technologies and who have designed, built, commissioned and operated world-scale facilities. The technology has been successfully demonstrated at lab scale for 18 years and at large (1.5 te/day) pilot scale for six years utilizing a wide range of feedstocks.

No other technology in this space has this type of track record.

The technology has a competitive advantage versus other biofuels technologies through its feedstock flexibility and ability to covert a number of different carbonaceous materials into both biofuels and renewable power. The INEOS Bio technology can be located near both the feedstock and distribution centers, thus providing an advantage for logistics intake as well as fuel off take and generation of renewable power. The use of zero or negative cost feedstocks provide an advantage in producing a lower cost and competitive biofuel. The plant has the ability to switch feedstocks based on their availability and relative cost to ensure that we are always using the most economically and environmentally sustainable feedstock at all times.

Alliances and Partnerships:

INEOS Bio is part of the INEOS Group of companies. INEOS is one of the largest independent refiners and producers of biofuels in Europe.

Development stage

Demonstration at Commercial Scale. 6 years of successful pilot plant testing at large scale (1.5 tons/day) with varied feedstocks has been completed.
Engineering and permitting now to demonstrate the technology in a commercial-scale facility (8mgy/yr) with startup expected 3Q 2011.

Website:

www.ineosbio.com

37. Renewable Energy Group

Renewable Energy Group is North America's largest biodiesel manufacturer and marketer. Utilizing an integrated supply chain model, Renewable Energy Group is focused on converting triglycerides into advanced biofuels. With more than 180 million gallons of owned/operated annual production capacity REG® is a proven partner in the distillate marketplace.

Address:

416 S. Bell Ave, Ames IA 50010

Founded:
Biodiesel business dates to 1996; Renewable Energy Group was incorporated in 2006 as a spin-off of its predecessor company, West Central.

Chief Executive Officer and contact email:

Jeff Stroburg, Chief Executive Officer
Daniel J. Oh, President and Chief Operating Officer

Annual Revenues:

Nine months ending September 30, 2010: $147 million 2009 Renewable Energy Group, Inc. and subsidiaries: $132 million

Major Investors
- West Central and affiliated entities
- Natural Gas Partners
- US Renewables Group •
  Bunge North America, Inc.

Type of Technology(ies)
Integrated biorefinery process technology

Feedstocks:
• Commercialized: Animal fats (pork, beef, poultry), Inedible corn oil, Used cooking oil, Vegetable oils (soybean, canola)
•Development/Research State – Algae, Camelina, Jatropha

Fuel Type:
Biodiesel

Fuel Cost (if applicable - per US gallon):
REG-9000TM branded biodiesel is competitively priced with diesel fuel. REG utilizes a feedstock- plus pricing model with index, long-term supply and volume contract options in addition to spot pricing.

Off-take partners (if applicable)
Specific customer information is confidential. Our domestic marketing focuses on petroleum refiners and importers (obligated parties) and petroleum distributors including retail fueling entities such as travel centers. In addition, we market to several direct-use segments such as underground mining, national fleets, electric power generation and the emerging Bioheat market.

Co-products (if applicable)
- Glycerin (three grades)
- Free fatty acid
- Soapstock
- Oleolipids

3 Top Milestones for 2009-10

1. Consolidated leading position in biodiesel industry.
a. Central Iowa Energy, LLC (February 2010) SEC 8-K filing:
http://www.sec.gov/Archives/edgar/data/1463258/000119312510055490/d8k.
htm
b. Blackhawk Biofuels, LLC (February 2010) SEC 8-K filing:
http://www.sec.gov/Archives/edgar/data/1463258/000119312510047926/d8k.
htm
c. Nova Biosource Fuels 60 MGY biodiesel facility (April 2010) SEC 8-K filing
http://www.sec.gov/Archives/edgar/data/1463258/000119312510084432/d8k.
htm
d. Tellurian Biodiesel, Inc. (July 2010) e. American BDF (a joint venture of Golden State Foods, Restaurant Technologies
Inc. and Tellurian Biodiesel) (July 2010) f. ARES Corporation's Clovis New Mexico 15 MGY biodiesel facility
(Sept. 2010), which included an $8mm strategic investment by ARES
SEC 8-K filing:
http://www.sec.gov/Archives/edgar/data/1463258/000119312510200497/d8k.
htm

2. Awarded multi-month contract for B100 with Hawaiian Electric Power Cooperative to fuel electric power generation

3. Published "Feedstock and Biodiesel Characteristics Report" available for industry use and download outlining the conversion of more than 30 commercial and novel feedstocks

into ASTM specification biodiesel. Approx. 5,000 downloads to date.

Major Milestone Goals for 2011-13

1. Expand into additional renewable fuels and renewable chemicals markets
2. Build upon market leadership through strategic acquisitions of existing biodiesel plants
3. Complete the 60 MGY REG New Orleans facility as fully integrated biorefinery
4. Raise growth-oriented capital
5. Expand current pilot algae to fuel/chemical to small-scale demonstration

Business Model:
P
roducer and marketer of renewable fuels and chemicals

Competitive Edge(s):

- Processing technology resulting in advanced fuel quality
- Nationwide marketing distribution
- Industry collaboration and partnership
- Experienced and expert management team

Distribution, Research, Marketing or Production Partnerships or Alliances

As largest biodiesel producer and marketer in North America, with a well established reputation for quality and reliability, REG sees significant growth opportunity fueled by the implementation of RFS2. REG leads the industry in its U.S. biodiesel distribution network having sold biodiesel in every state except Alaska.
REG is able to process the widest array of commercially available feedstocks and has aggressively converted the majority of its biodiesel production assets into waste feedstock biodiesel facilities. REG has also partnered with low cost waste feedstock providers to provide large, consistent, reliable volumes of waste feedstock, which is indexed to the energy markets rather than the agricultural markets, enabling REG to more effectively manage commodity risk for itself and its customers.
Research • General Atomics DARPA Algae-to-Jet Fuel Project Team Member • Battlefield Clutter: Waste-to-Energy Program through General Atomics • Locomotive biodiesel engine performance testing in collaboration with Interstate Railroad and Kansas University

Stage
Renewable Energy Group is the largest commercial producer of biodiesel in North America. We are also a partner/commercialization vehicle for new fuels and renewable chemicals being developed by others.

Website URL:
www.regfuel.com

38. Rentech

Company name:
Rentech, Inc. (NYSE AMEX: RTK)

Company description:
Rentech, Inc. provides clean energy solutions. The Company's Rentech-SilvaGas biomass gasification process can convert multiple biomass feedstocks into synthesis gas (syngas) for production of renewable fuels and power. Combining the gasification process with Rentech's unique application of syngas conditioning and clean-up technology and the patented Rentech Process based on Fischer-Tropsch chemistry, Rentech offers an integrated solution for production of synthetic fuels from biomass. The Rentech Process can also convert syngas from fossil resources into ultra-clean synthetic jet and diesel fuels, specialty waxes and chemicals. Final product upgrading is provided under an alliance with UOP, a Honeywell company. Rentech develops projects and licenses these technologies for application in synthetic fuels and power facilities worldwide. Rentech Energy Midwest Corporation, the Company's wholly-owned subsidiary, manufactures and sells nitrogen fertilizer products including ammonia, urea ammonia nitrate, urea granule, and urea solution in the corn-belt region of the central United States.

Among other projects, Rentech is currently developing a first-of-its-kind renewable energy facility in California for the co-production of renewable drop-in certified synthetic diesel and renewable electricity from woody green waste. The Rialto Project is currently in the Front End Engineering Design and Permitting phases and is a candidate for a Department of Energy loan guarantee.

Address:
10877 Wilshire Blvd., Suite 600, LA, CA 90024

Year Founded:
1981

Chief Executive Officer and contact email:
Hunt Ramsbottom, hramsbottom@rentk.com

Annual Revenues:
2009: $187 million

Major Investors *(if a public company, please provide trading symbol and exchange).*
Rentech has been publicly traded since 1991. Our stock trades on the NYSE AMEX under the symbol RTK. Our largest institutional holders are BlackRock Investment Management Company, Wellington Management Company, the Vanguard Group and State Street

Global Advisors.

Type of Technology(ies)
Biomass Gasification: The Company's Rentech-SilvaGas biomass gasification process can convert multiple biomass feedstocks into synthesis gas (syngas) for renewable power production and can be integrated for conversion into hydrocarbons by the patented Rentech Process based on Fischer-Tropsch chemistry. This gasifier technology has operated at commercial scale of 400 tons per day.

Rentech is jointly demonstrating with ClearFuels Technology that company's biomass gasification system and its integration with Rentech's Fischer-Tropsch technology for the production of renewable drop-in synthetic jet and diesel fuels from virgin biomass. Rentech owns 25% of ClearFuels.

Syngas Cleanup: Rentech has novel and patent-pending technologies for the cleanup of syngas required for the production of synthetic fuels from biomass-derived syngas.

Synthetic Fuels: The Rentech Process can convert syngas from fossil resources into hydrocarbons which can be processed and upgraded into ultra-clean synthetic jet and diesel fuels, specialty waxes and chemicals. Rentech's $85 million Product Demonstration Unit in Colorado produces 10 barrels per day of certified synthetic jet and diesel fuels.

Feedstocks:
The Company's Rentech-SilvaGas biomass gasification process has been demonstrated to produce syngas from biomass feedstocks such as wood waste, green waste, agricultural waste, refuse derived waste, straw, switch grass and energy crops.

ClearFuels' biomass gasification technology has been demonstrated to produce syngas from virgin biomass feedstocks such as wood wastes, sawdust, bark, sugarcane bagasse, rice hulls and straw, corn stover and other clean biomass.

Rentech's Fischer-Tropsch process can process syngas derived from any carbon-bearing feedstock such as biomass, municipal waste and natural gas into hydrocarbons which can be processed and upgraded into ultra-clean synthetic jet and diesel fuels, specialty waxes and chemicals.

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc)
Drop-in clean synthetic fuels: Rentech produces drop-in synthetic diesel fuel that meets ASTM-975 specs. Rentech's synthetic jet fuel has been certified by the FAA for commercial aviation use and by the U.S. Air Force for use in its aircraft. All fuels produced by the Rentech Process can be distributed and used in existing infrastructure including pipelines and engines and are cleaner burning than traditional petroleum-derived fuels. Rentech's ultra low sulfur diesel fuel, or RenDiesel, is environmentally friendly. RenDiesel is

biodegradable, exceeds all global sulfur requirements and has no aromatics. When compared to traditional petroleum-derived low sulfur diesel, tailpipe emissions from RenDiesel generate lower amounts of hydrocarbons, carbon monoxide, particulate matter, nitrogen oxides (NO_X), sulfur oxides (SO_X) and carbon dioxide. Also, when compared to traditional diesel fuels, RenDiesel has higher hydrogen content, heating value and cetane index, making it very energy efficient. RenDiesel also has excellent storage stability making it an ideal fuel for back-up power generators.

Renewable RenDiesel **reduces greenhouse gas emissions on a lifecycle basis** by as much as 97% over conventional diesel fuel and by a comparable amount over electric vehicles. A vehicle using RenDiesel is also expected to be as much as two times more fuel efficient than one running on ethanol. **RenDiesel contains approximately 60% more energy per gallon than ethanol** and diesel engines typically achieve 20-40% more miles per gallon than gasoline engines. RenDiesel also produces fewer volatile organic compound (VOC) emissions than ethanol or traditional diesel.

RenJet, our military and commercial jet fuel, has all of the positive environmental and efficiency benefits of RenDiesel. Moreover, **RenJet reduces aircraft particulate matter emissions by 96% in engine idle**, a major source of ground level pollution. In addition, the lower density of RenJet fuel could enable aircraft to have a lower take-off weight, which conserves fuel and, therefore, lowers operating costs. Alternatively, the lower density of RenJet fuel could allow aircraft to carry heavier payloads with the same volume of fuel when compared to traditional jet fuel.

We have provided synthetic fuels to:

- United Airlines for use in the first U.S. commercial flight flown on certified alternative jet fuel
- Audi for an extended 1000 mile journey run exclusively on 100% synthetic diesel
- the U.S. Air Force for testing in a T-63 turbine engine
- the U.S. Military for use in a LASSO(R) Utility Vehicle designed and built for the U.S. Military by ICRC/VSE Corporation
- The University of West Virginia for emissions testing of synthetic fuels with a 4,000 horsepower Norfolk Southern locomotive engine, a 1,000 horsepower Caterpillar engine provided by Walker Equipment and a 96 horsepower underground engine provided by the Mine Safety and Health Administration
- commercial airlines for testing

Fuel Cost (if applicable - per US gallon): *(If you do not manufacture or have long-term stable feedstock pricing, please use the latest December futures contract pricing for traded feedstocks, or $55/ton for untraded biomass – or provide notes on your own feedstock pricing assumptions).*
Specific cost per gallon of fuel produced will vary based on feedstock and plant design. The renewable energy facility we are developing in California will use green waste as an input, so feedstock costs are expected to be negative, thereby reducing production costs. We expect that our production costs will allow us to be competitively priced with future market

prices for diesel and jet fuels as well as renewable power.

Offtake partners (if applicable)
Contract for RenDiesel for ground equipment at LAX: Rentech signed an unprecedented multi-year agreement to supply eight airlines with up to 1.5 million gallons per year of renewable synthetic diesel (RenDiesel®) for ground service equipment operations at Los Angeles International Airport (LAX) beginning in late 2012, when Rentech's renewable energy facility is scheduled to go into service.

The initial purchasers under the agreement with Aircraft Service International Group (ASIG), the entity that provides fueling services to many airlines that operate at LAX, are Alaska Airlines, American Airlines, Continental Airlines, Delta Air Lines, Southwest Airlines, United Airlines, UPS Airlines and US Airways. Additional airline purchasers of RenDiesel® can be added under the agreement with ASIG. The agreement is the first of its kind to supply renewable synthetic fuels to multiple domestic airlines.

MOU with thirteen airlines for RenJet: Rentech signed a Memorandum of Understanding with thirteen domestic and international passenger and cargo carriers that is intended to serve as a framework for a future definitive supply agreement for certified jet fuel from Rentech's proposed synthetic fuels and power facility in Adams County, Mississippi (Natchez Project).

The non-binding MOU signed by Rentech and Air Canada, AirTran Airways, American Airlines, Atlas Air, Delta Air Lines, FedEx Express, JetBlue Airways, Lufthansa German Airlines, Mexicana Airlines, Polar Air Cargo, United Airlines, UPS Airlines and US Airways includes terms that are anticipated to serve as the basis of a possible definitive purchase agreement by these carriers for the Natchez Project's entire synthetic jet fuel production of approximately 250 million gallons per year.

Co-products (if applicable)
Synthetic fuels, waxes and chemicals; renewable power: When pairing the Company's Rentech-SilvaGas biomass gasifier with Rentech's Fischer-Tropsch process, an integrated renewable energy facility can co-produce several high-value products: renewable baseload electricity which qualifies under FIT and RPS programs; renewable drop-in, certified synthetic diesel or jet fuel that qualifies for LCFS, RFS, RINs, etc., and renewable naphtha which can be used in the production of renewable plastics and other biodegradable products.

A large scale synthetic fuels facility utilizing Rentech's Fischer-Tropsch process can also produce the following by-products: rare gases such as argon, krypton and xenon for steel manufacturers or specialty gases customers; slag for paving and roof shingle manufacturers; spent catalyst from the Rentech Process for steel producers; chemicals such as propane and butane for combustion turbines; sulfuric acid for fertilizer businesses; electricity and naphtha; and carbon dioxide for enhanced oil recovery and other industrial uses.

3 Top Milestones for 2009-10
Our 3 top milestones for fiscal year 2010, in no particular order, are as follows:

Rialto Renewable Energy Center: We are developing what is anticipated to be the first-of-its-kind commercial facility in the country that will convert urban green waste such as yard clippings and tree trimmings into approximately 600 daily barrels of the cleanest diesel fuels in California and enough renewable electricity to power about 30,000 homes. This Project advanced into the front end engineering and design (FEED) phase with Fluor Corporation, with all major permit applications filed. The project remains on schedule and is on budget and is a candidate for a Department of Energy loan guarantee.

The efficacy and application of our certified synthetic jet and diesel fuels were demonstrated with large, credible partners.

United Airlines flight on RenJet: Our synthetic jet fuel powered the first U.S. commercial flight on certified alternative jet fuel. United Airlines conducted the successful engineering validation flight, which marked the first time a U.S. commercial airline has used synthetic jet fuel in flight and underscores Rentech's leadership role in a lower carbon future with the use of domestic technology and resources to fuel the nation's transportation needs.
The synthetic jet fuel used in the flight was produced at Rentech's Product Demonstration Unit, which is believed to be the only operating integrated synthetic transportation fuels facility in the U.S. RenJet®, produced from renewable or fossil feedstocks, is the first and only alternative fuel type certified for use by commercial aviation. Rentech's synthetic jet fuel can be distributed and used in existing infrastructure including pipelines and engines and are cleaner burning than traditional petroleum-derived jet fuel.
The validation flight was conducted using a 40/60 mix of Rentech's synthetic jet fuel with conventional Jet A fuel in one of two engines on an Airbus 319 aircraft. The aircraft departed Denver International Airport and climbed to an altitude of 39,000 feet where the onboard team collected data on the performance of the fuel during several maneuvers, including taxi, takeoff, climb, cruise, auxiliary power unit start, descent and approach. The synthetic jet fuel, derived from natural gas and converted to liquid fuel through the Rentech Fischer Tropsch process, is approved by the ASTM International and is safe for use on passenger flights.

Audi 1000-mile drive using 100% RenDiesel: Audi fueled two Audi A3 TDIs with 100% Rentech synthetic RenDiesel during a four day, 1,000 mile journey spanning the state of California. Audi indicated that RenDiesel performed "flawlessly" during this drive, which demonstrated that clean diesel technology such as the Audi A3 TDI, Green Car Journals' Green Car of the Year, and ultra-clean synthetic RenDiesel, are viable solutions that can be deployed today to minimize the transportation sector's environmental impact. Ron Cogan, editor and publisher of Green Car Journal and editor of GreenCar.com, said, "Operating on advanced, clean burning fuels like synthetic RenDiesel simply make the diesel equation even more compelling."

DOE Grant for Integrated Biorefinery Demonstration Plant: Our joint integrated bio-refinery project with ClearFuels was awarded a $23 million grant from the Department of Energy. The grant award will be used to manufacture and install at Rentech's Energy Technology Center a 20 ton-per-day ClearFuels biomass gasifier designed to produce synthesis gas from various wood waste and sugar cane bagasse feedstocks. The gasifier will be integrated with Rentech's existing Product Demonstration Unit at the site, which uses the Rentech Process and UOP's upgrading technologies to produce renewable drop-in synthetic jet and diesel fuels at demonstration scale. This joint demonstration of an integrated bio-refinery is anticipated to be completed in late 2011 and will lead to the final design basis for commercial facilities that are expected to use the combined technologies. The proposed team for the demonstration project includes ClearFuels, Rentech, URS, Linde/Hydro-Chem, Hawaiian Electric Company, National Renewable Energy Lab and Hawaii Natural Energy Institute. Rentech has a 25% strategic ownership interest in ClearFuels, which has begun development of multiple commercial-scale biomass-to-energy projects in the southeastern United States, Hawaii and internationally. These projects are expected to use an integrated ClearFuels-Rentech design and be co-located at biomass processing facilities.

3 Major Milestone Goals for 2011-13
Among our top goals for fiscal years 2011-2013 are:

Continued development, completion and start-up of our proposed Rialto Renewable Energy Center. This is expected to include the award of all required permits, completion of FEED, construction, and commissioning of the facility as well as securing off-take agreements for the remaining uncommitted renewable diesel and power products and the close of financing.

Development of additional renewable energy facilities. This includes renewable fuels facilities, renewable fuels and power facilities and/or repowering projects.

Continued enhancement of our technology portfolio to maintain our energy conversion technology leadership. This includes enhancing, developing and acquiring technologies to allow us to target broader markets, lower capital cost and improve unit economics.

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)
Rentech's business model encompasses being:

- a developer/owner/operator of synthetic fuels and power facilities (particularly renewable energy facilities)
- a developer of synthetic fuels and power facilities
- a licensor of energy conversion technologies of biomass gasification, syngas cleanup, and/or Fischer-Tropsch for the production of synthetic fuels and power facilities from renewable and fossil resources as well as a licensor of biomass

gasification technology for repowering coal-fired power plants for production of renewable electricity.

Competitive Edge(s):

Rentech has several competitive advantages:

- We have technology that is ready for commercial deployment today-Through direct ownership and with established technology partners, Rentech has an integrated bio-energy solution for the production of renewable, drop-in fuels and power. We also have the ability to use fossil resources cleanly to produce drop-in synthetic fuels and power.
- We maintain technology leadership – We have an unmatched biomass-to-energy technology chain based on proven technologies. We have a strong patent portfolio of demonstrated biomass gasification and Fischer-Tropsch technologies.
- Our technology allows for economic small-scale commercial production of renewable synthetic fuels as well as large-scale production of synthetic fuels from fossil resources.
- We constructed and operate the only full-integrated transportation fuels production facility in the U.S. We have produced thousands of gallons of ultra-clean synthetic fuels including military jet fuel, commercial Jet A and Jet A-1 and ultra-low sulfur diesel have been produced at our facility and have met or exceeded applicable fuels standards.
- Our fuels can be used in existing engines and infrastructure and is the only fuel type certified by the U.S. Air Force and FAA.
- We have laboratory research facilities and a product demonstration unit that allows us to continue to develop our technologies for commercialization and provide relevant quantities of fuels for evaluation by partners and customers.
- We have a pipeline of projects under development for the production of synthetic fuels and power.
- We have an operating asset that is the underlying economic base that supports the commercialization of our proven energy conversion technologies.

Distribution, Research, Marketing or Production Partnerships or Alliances.

We believe that having the right strategic partners will help us realize our vision of delivering clean energy solutions. The many advantages of the Rentech Process have enabled us to enter into relationships with key strategic partners and, as our business grows, we expect to enter into more of these relationships. Developing relationships with world class technology leaders allows us to provide a more complete product offering to our customers, licensees, and partners.

<u>Denbury Resources, Inc. ("Denbury").</u> Together with gasification and upgrading technologies, the Rentech Process enables us to produce ultra-clean fuels and chemicals that are cleaner than petroleum-based products in terms of regulated emissions (NOX, SOX, and particulates) and carbon dioxide. Our process captures up to approximately 80% of the carbon dioxide generated during the production process. We have entered into an

agreement with Denbury, an independent oil and gas company, to sell to them all the carbon dioxide we capture at our proposed Gulf Coast Synthetic Energy Center near Natchez, Mississippi (Natchez Project). Denbury expects to use the CO2 for Enhanced Oil Recovery, which would effectively sequester the carbon. Under this long-term agreement, Denbury plans to build a pipeline to our Natchez facility and transport the captured carbon dioxide underground to depleted oil fields to produce otherwise unrecoverable domestic oil reserves. The CO2 from the Natchez Project will effectively replace naturally occurring CO2 that Denbury is currently extracting from its Jackson Dome deposit. It is estimated that the carbon dioxide generated in the production of one barrel of synthetic fuel like RenDiesel® or RenJet® will facilitate the production of two additional barrels of crude oil. Our relationship with Denbury will lower the carbon footprint of the Natchez Project as well as help America's efforts to reduce its dependency on imported oil. Moreover, we believe the emissions reducing characteristics of the Rentech Process, together with our alliance with Denbury, will result in our Natchez facility being one of the cleanest fuel production facilities in the country.

UOP. UOP, a Honeywell company, whose roots date back to 1914, is the premier refining technology company in the world. UOP's cutting-edge technology advances create higher yields and higher quality products. In addition, they also create cleaner technologies and processes for a healthy environment. Rentech has entered into an agreement with UOP to jointly offer our two companies' respective technologies for the commercial production of synthetic fuels. The proprietary and patented Rentech Process can convert synthesis gas from a wide array of biomass and fossil resources into ultra-clean hydrocarbons. These hydrocarbons are then converted into finished fuels with UOP hydrocracking and hydrotreating technology. As commercialization partners, Rentech and UOP expect to increase our market reach and jointly offer proven technologies that can produce products that are cleaner than traditional petroleum-derived fuels and chemicals UOP's technology will be used in Rentech's Rialto Renewable Energy Center to refine and upgrade hydrocarbons from the Rentech Process into ultra-clean synthetic renewable RenDiesel and naphtha.

Fluor Corporation ("Fluor"). Fluor is providing the front-end engineering and design (FEED) services for Rentech's Rialto Renewable Energy Center. Under the agreement, Fluor will perform FEED services for the facility and the supporting infrastructure for the project. Fluor has executed more than 20 gasification projects globally and performed more than 150 gasification feasibility studies. In addition, Fluor has helped develop the major Fischer-Tropsch plants in operation today.

Jacobs Engineering Group, Inc ("Jacobs"). We launched an engineering program with Jacobs Engineering Group Inc., one of the world's largest and most diverse providers of engineering and construction services, to assist us in completing a commercial-scale Reactor Design Package for the Rentech Process. This work will enable us to estimate the capital costs for our reactor. Jacobs also conducted the feasibility engineering work for our proposed renewable fuels and power facility in California.

<u>ClearFuels Technology Inc. ("ClearFuels").</u> Rentech has made a 25% strategic investment in ClearFuels, a biomass gasification and project development company. ClearFuels will install a demonstration-scale biomass gasifier at our Product Demonstration Unit in Commerce City, Colorado to produce syngas from bagasse, virgin wood waste and other cellulosic feedstocks. The gasifier will be integrated with Rentech's Fischer-Tropsch Process and UOP's upgrading technology to produce high-quality renewable drop-in synthetic jet and diesel fuel at demonstration scale.
ClearFuels Technology Inc. has signed an exclusive worldwide license with us for the use of our patented and proprietary Fischer-Tropsch synthetic fuels technology for the production of renewable drop-in fuels from sugarcane bagasse. ClearFuels has also signed a license with us for the use of the Rentech Fischer-Tropsch Process for the production of renewable synthetic fuels from virgin wood waste at up to twelve U.S.-based projects to be developed by ClearFuels.

ClearFuels has begun development of multiple commercial-scale biomass-to-energy projects in the southeastern United States, Hawaii and internationally. These projects will use an integrated ClearFuels-Rentech design pursuant to the licensing agreements and will be co-located at sugar mills and wood processing facilities. The U.S. wood waste projects alone are estimated to have an aggregate annual capacity of more than 100 million gallons of renewable synthetic fuels and 30 MW of renewable power.

<u>Aircraft Service International Group (“ASIG”).</u> We have signed an unprecedented multi-year agreement to supply eight airlines with up to 1.5 million gallons per year of renewable synthetic diesel (RenDiesel®) for ground service equipment operations at Los Angeles International Airport (LAX) beginning in late 2012, when our Rialto Renewable Energy Center, which will produce the fuel, is scheduled to go into service.
The initial purchasers under the agreement with ASIG, the entity that provides fueling services to many airlines that operate at LAX, are Alaska Airlines, American Airlines, Continental Airlines, Delta Air Lines, Southwest Airlines, United Airlines, UPS Airlines and US Airways. Additional airline purchasers of RenDiesel® can be added under the agreement with ASIG.

<u>US Air Force.</u> The US Air Force has purchased our synthetic jet fuel for performance and emissions testing in a turbine engine. The purchase followed the Air Force’s laboratory testing of Rentech’s synthetic jet fuel, which confirmed that the quality and characteristics of our jet fuel meet the Air Force’s specifications for synthetic fuels.

<u>United Airlines.</u> United Airlines, one of the world’s largest carriers, partnered with Rentech to conduct an engineering validation flight to using Rentech’s certified synthetic jet fuel (RenJet®). The flight marked the first time a U.S. commercial airline used synthetic jet fuel in flight and underscored role synthetic jet fuel such as Rentech’s will play in a

lower carbon future with the use of domestic technology and resources to fuel the nation's transportation needs.

Audi. Audi, the world's fastest growing car company, partnered with Rentech for a four-day, 1,000 mile journey across California. During the journey, two Audi A3 TDIs, Green Car Journals' 2010 Green Car of the Year, were fueled exclusively on 100% synthetic RenDiesel. The endurance drive demonstrated that today's diesel technology and Rentech's synthetic RenDiesel have significant green advantages in the push to reduce greenhouse gas emissions and fuel consumption to make America less reliant on imported oil.

Norfolk Southern and Walker Caterpillar. Rentech sponsored several tests of synthetic fuels in various engine types. The University of West Virginia conducted emissions testing of synthetic fuels with a 4,000 horsepower Norfolk Southern locomotive engine, a 1,000 horsepower Caterpillar engine provided by Walker Equipment and a 96 horsepower underground engine provided by the Mine Safety and Health Administration. Initial results of these tests have confirmed that synthetic fuels are cleaner burning than traditional ultra-low sulfur diesel fuels, with lower particulate matter and no visible emissions from the use of these synthetic fuels in the engines. Ongoing testing of synthetic fuels in a fleet of on-road vehicles is continuing for further data collection on fuel efficiency and emissions.

Pall Corporation. Pall Corporation, a world leader in filtration and separation technology has entered into a Preferred Supplier Agreement with Rentech to supply leading edge AccuSep® purifying technology to our Rentech Process. The AccuSep® purifying technology will allow us to separate the wax created from the Rentech Process from our catalyst. The technology will be utilized at both our Product Demonstration Unit and Rialto Renewable Energy Center.

Mann Turbo & Diesel. Mann Turbo & Diesel based in Augsburg, Germany, is one of the world's leading providers of gas turbine engines and is one of Germany's 30 largest companies. We have entered into a supply agreement with Mann Turbo & Diesel to supply Rentech's proprietary Fischer-Tropsch equipment.

Hitachi Zosen Corporation. Hitachi Zosen Corporation, a Japanese developer, manufacturer, and seller of environmental equipment has entered into exclusive supply agreement with Rentech to produce our proprietary Fischer-Tropsch equipment.

ENVIRON International ("ENVIRON"). ENVIRON has been engaged to act as Rentech's consultant and contractor for the permitting process for our proposed Rialto Renewable Energy Center based in Rialto, California. ENVIRON will assist in preparing applications for permits necessary to construct and operate the Rialto Project and also perform technical studies for the environmental documents needed to satisfy the California Environmental Quality Act (CEQA). ENVIRON has been involved in the issuance of major air permits in California's South Coast Air Quality Management District, the agency to which the Rialto Project is subject, and has long been involved with preparing environmental documentation under CEQA.

Stage (Bench, pilot, demonstration, commercial)
Rentech is commercially deploying its proven energy conversion technologies. During our nearly 30-year history, Rentech and our licensees have successfully applied the Rentech Process in facilities ranging in size from pilot scale to 300 barrels per day of synthetic fuels and chemicals production. Our first renewable facility was built in 1992 and used landfill gas to produce alternative fuels. The Rentech-SilvaGas biomass gasifier is one of only a handful of biomass gasifiers that have operated on a commercial scale. Today we are working on waste-to-energy projects, including a facility in Rialto, California that would produce approximately 600 daily barrels of renewable synthetic fuels and 35 megawatts per hour of renewable power. We are also working on commercial-scale fossil projects, including a commercial scale synthetic jet facility in Adams County, Mississippi.

Website URL
www.rentechinc.com

39. Praj Industries

Based in:
Praj House, Bavdhan, Pune – 411021. India

Year Founded:
1984

Annual Revenues

2009 Projected : US $ 187 M
2008 Audited : US $ 159 M
2007 Audited : US $ 145 M

Type of Technology

Fermentation, Distillation, Dehydration, Evaporation, waste-water treatment and re-utilization, for first generation bioethanol and esterification, trans-esterification, technologies for biodiesel plants.

Second and Third generation under pilot-scale and lab scale respectively.

Type of fuel

Turnkey solutions to install plant and equipment to produce bioethanol and biodiesel from 1st and 2nd generation energy crops

Past milestones:

1. Inaugurated Lignocellulose to Ethanol pilot plant

2. Inaugurated first-of-its-kind zero discharge wastewater plant wherein Praj supplied its patented self cleaning, extended operation evaporation system.

3. Energy efficient ethanol plants in Europe for Biowanze, Belgium and Anklam Biofuels, Germany.

Future milestones:

1. To offer alternate, low carbon footprint, Farm-to-Fuel modules for biofuels
2. To achieve critical milestones in Lignocellulosic biomass to ethanol production
3. To establish a Pilot plant for algae to biodiesel

Business Model
Complete services under one roof for biofuel plants

Competitive edge
Technology, experience, own manufacturing units, global presence and R & D backed solutions

Distribution
Praj is operating across 5 continents with over 450 references

Stage
Praj offers entire solutions right from concept to commissioning – for installing biofuel comple

Website
www.praj.net

40. Neste Oil

Based in:
Finland

Annual Revenues

N/D

Type of Technology

NextBTL renewable diesel.

Past milestones:

1. Commenced construction at 300 Mgy Jurong Island complex in Singapore.
2. Announced project for Finland.
3. In September, Neste Oil announced that it has applied for patents to cover technology developed to produce microbial oil from waste and residues with the help of various yeasts and molds for use as a feedstock for its NExBTL renewable diesel. Research work started with the Aalto University School of Science and Technology at the end of 2007 has resolved the process technology-related challenges involved; and microbial oil produced in this way has already been successfully refined into NExBTL renewable diesel.
4. In October, Neste Oil and Stora Enso are seeking sites for a facility that would produce 200,000 metric tons per year of renewable diesel from wood waste using Neste's NExBTL technology. The plan will develop its environmental impact assessment beginning in November with the plant built possibly as early as 2012. Neste plans to open its 800,000 ton NExBTL plant in Singapore before the end of the year and another one of the same size in Rotterdam next year.

Future milestones:

N/D

Business Model

Owner-operator

Competitive edge
First-mover advantage, scale, in renewable diesel

Stage
Commercial

Website
www.nesteoil.com

41. LanzaTech

Company description:
The LanzaTech process increases industrial energy efficiency by capturing waste gases (CO, CO2) and converting them to valuable fuels and chemicals. LanzaTech provides an opportunity to produce large volumes of low carbon fuel and chemicals at low costs using a countries own resources, reducing dependence on foreign imports and GHG footprint. Simply utilizing the available steel mill waste gases, LanzaTech could produce more than 30 billion gallons of ethanol per year. This would have a significant impact on the global energy landscape.

Address:

24 Balfour Road, Parnell, Auckland New Zealand

Year Founded:
2005

Chief Executive Officer:
Dr Jennifer Holmgren

Annual Revenues:
n/a

Major Investors
Khosla Ventures, Qiming Ventures, Soft Bank China

Type of Technology(ies):
Microbial gas fermentation technology

Feedstocks:
The LanzaTech process is feedstock agnostic and is not dependent on any one resource for gases. The LanzaTech process has already been proven utilizing steel mill off gases as well as synthesis gas derived from biomass. This means that all synthesis gas is a suitable feedstock including gases derived from coal, petroleum coke, natural gas, municipal solid waste etc.

Fuel Type (if applicable):
Ethanol, renewable jet fuel, renewable diesel, renewable gasoline

Fuel Cost (if applicable - per US gallon):
Our cost of production, including steel mill gas feedstock, is approximately $1.60 per gallon. Excluding feedstock costs, our cost of production is estimated at $0.70-$0.80 per gallon, depending on site location and local utility costs.

Offtake partners (if applicable): In negotiations

Co-products (if applicable) 2,3 butanediol

3 Top Milestones for 2009-10

- Series B investment: $18 million raised.
- Strategic partnership agreement with Chinese Academy of Sciences and GM
- Partnership agreement with largest steel producer in China, Baosteel.

3 Major Milestone Goals for 2011-13

- Construction of demonstration facility at a steel mill site in China: steel mill off gases to ethanol
- First commercial facility in operation at a steel mill in China; producing 50 million gallons of ethanol per year
- Demonstration of waste gas fermentation to chemicals platform

Business Model:
Technology licensor and owner/operator

Competitive Edge(s):
The LanzaTech process is the only process which converts waste gases to fuels and chemicals. LanzaTech has proven its process using industrial waste gases with its proprietary microbe. Waste gases have never been used before as a feedstock as the conditioning process makes it economically unfeasible. LanzaTech's microbe does not require the gases to be conditioned and so they are able to use this available low cost waste product as a feedstock.

Distribution, Research, Marketing or Production Partnerships or Alliances.
Research partnership with Chinese Academy of Sciences (CAS) and GM.

Stage (Bench, pilot, demonstration, commercial) Demonstration stage

Website URL www.lanzatech.co.nz

42. OriginOil

Company description:

OriginOil, Inc. is developing a breakthrough technology that will transform algae, the most promising source of renewable oil, into a true competitor to petroleum. Our technology will produce "new oil" from algae, through a cost-effective, high-speed manufacturing process. This endless supply of new oil can be used for many products such as diesel, gasoline, jet fuel, plastics and solvents without the global warming effects of petroleum. Our unique technology, based on algae, is targeted at fundamentally changing our source of oil without disrupting the environment or food supplies. Instead of drilling for old oil, we can now manufacture clean, new oil, anytime and anywhere, delivering a revolutionary breakthrough to the world.

Address:
5645 W Adams Blvd, Los Angeles 90016

Year Founded: 2007

Chief Executive Officer:
Riggs Eckelberry

Annual Revenues:
<100K/yr

Major Investors:
No institutional investors at this time; private accredited individuals only.

Type of Technology(ies):
Algae to oil

Feedstocks: CO2, water, nitrates, light

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc)
Our technology will produce feedstock for all the above.

Fuel Cost (if applicable - per US gallon):

The cost of algae fuel is dependent on the location, technology platform and project application (carbon capture, wastewater treatment, etc.). Our technology is designed to increase the efficiency of production, thereby lowering the price of fuel and co-products. At this point there is no definitive estimate for fuel costs.

Offtake partners (if applicable)

N/A

Co-products (if applicable)

In addition to fuel products, our technology is capable of producing feedstock for a wide range of co-products, including animal feed, fertilizer, specialty products (nutraceuticals, cosmetics), bioplastics, and solvents.

3 Top Milestones for 2009-10

1. Mobile extraction lab deployed to develop field knowledgebase, demonstrate extraction process to potential customers.
2. First major customer signed for CO2 feeding and oil extraction systems
3. First field installation of CO2 feeding and extraction systems

3 Major Milestone Goals for 2011-13

1. Implementation of algae processing systems in a major bio-remediation setting (e.g. coal-fired power plant)
2. Collaboration achieved with a global OEM distributor
3. Scale-up of extraction systems to demonstration scale.

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

Technology licensor.

Competitive Edge(s): Distribution, Research, Marketing or Production Partnerships or Alliances?

Key enabling technologies for multiple inflection points in the algae production process

Stage (Bench, pilot, demonstration, commercial)
Pilot

Website URL: http://www.originoil.com/

43. Choren

Based in: Germany
Business:
Biomass to liquids producer.

Model:
Owner-operator.

Past milestones:

Choren Industries and Norske Skog announced that they will jointly evaluate the potential for an advanced biofuels plant using wood biomass as feedstock for a synthetic biofuels process. Choren recently completed construction on a 4.5 Mgy demonstration biomass-to-liquids plant in Germany. Choren has said that it hopes to increase capacity at that plant to commercial scale of 71 Mgy.

Volkswagen and Daimler acquired a minority shareholding in CHOREN Industries, a biofuels producer with a goal of producing 60 Mgy of BTL (biomass-to-liquid) second generation biomass-based synthetic fuel.

Future milestones:
Choren's plant in Freiburg - targeting 15,000 tonnes of biomass-to-liquid fuels is scheduled to open in early 2010, according to reports in Reuters and Lesprom. The plant utilizes wood products and wood-based waste, while a second planned plant in Schwedt will have a capacity of 200,000 tonnes.

Metrics:
CHOREN is currently building a beta plant in Freiberg site that will produce 4 Mgy. The company's target is 10-15 plants constructed by 2020 to reduce C02e emissions by 3 million metric tons.

44. Solix

Based in: Colorado

Business:
Algal fuel developer

Model:
Owner-operator

Past milestones:
Solix Biofuels completed its $16.8 million Series A capital funding that added Shanghai Alliance Investment to its group. Proceeds will be used to finance construction and commencement of operations at the company's Coyote Gulch Demonstration Facility, which will be operational by late summer 2009. I2BF Venture Capital, Bohemian Investments, Southern Ute Alternative Energy LLC, Valero Energy Corp., and Infield Capital also invested in this round.

Solix Biofuels said that it has commenced production of algal oil at its Coyote Gulch Demonstration Facility, and said that full-scale commercial operation would commence later this summer. The Coyote Gulch farm is on two acres near Durango, on Southern Ute tribal land. Solix said that it expects to reach a production rate of 3,000 gallons per acre per year by later this year at the facility.

Dr. Bryan Willson, co-founder and Chief Technology Officer of Solix, has been named to the Scientific American 10: Guiding Science for Humanity", as "the 10 most influential people in the nation who have demonstrated outstanding commitment to assuring that the benefits of new technologies and knowledge will better humanity."

In September, BASF and Solix Biofuels announced an agreement to investigate the use of algae to produce certain chemicals for BASF. Solix is a leading developer of algae cultivation technology systems and will test multiple algae species in its proprietary growth system, AGSTM, for BASF. "Algae represent a fascinating addition to BASF's technology portfolio," said Harald Lauke, President of the Specialty Chemicals Research at BASF, "as they offer the potential to produce a number of exciting specialty products. After surveying the algae industry, we chose to work with Solix based on its knowledge of algal biology and the strength of its AGS."

Future milestones:
Development of commercial-scale photobioreactor facility.

Metrics:

The company says it is currently at around 2500 gallons per acre, and said that the company is on track to achieve cost parity with $80 oil in 3-4 years.

The company has said that it can produce algae-based fuel on a scaled-up basis at this point, for $32.81 per gallon. Solix, which has a photobioreactor-based technology, said that it can reduce the cost to $5.50 per gallon by eliminating external power consumed in drying its algae and powering the bioreactors, and reducing it further to $3.50 per gallon through sales of algae-based byproducts including proteins.

45. Chemrec

Based in: Sweden, US subsidiary based in Illinois.

Year Founded: 1989

Annual revenues

2009 MSEK 40 million

2008 MSEK 32 million

2007 MSEK 20 million

Type of technology

The technology is gasification of black liquor for syngas generation followed by fuel synthesis. Black liquor is an abundantly available liquid biomass feedstock (600 TWh per year globally) with unique gasification properties allowing single step gasification to raw syngas of high quality (very low methane and tar content). In addition to supplying syngas the gasification process simultaneously provides chemicals recovery capacity for the host pulp mill cutting the effective investment cost significantly

Type(s) of fuel

The type of fuel is flexible since the route is over syngas. Preferred fuels from a technical and economic standpoint are methanol and DME (dimethyl ether) which are the fuels produced with highest yield, energy efficiency and GHG emission reductions and with the lowest product cost on an energy content basis (regardless of which type of gasification front-end is included). In the extensive well-to-wheel joint study by the research institutes European auto industry (EUCAR), refinery industry (Concawe) and European Union (JRC), the combination of black liquor gasification and these fuel products were identified as the most energy-efficient and having the highest greenhouse gas emission reduction among the multitude of fuels studied.

Major investors

VantagePoint Venture Partners, Environmental Technologies Fund, Volvo Technology Transfer, Nykomb Synergetics

Past milestones:

a) Created the BioDME consortium (Volvo Trucks, Total, Preem, Haldor Topsoe, Delphi, ETC and Chemrec) and completed financing for the BioDME technical demonstration project. The project includes development and production of heavy truck test fleet based on DME fuel, production of BioDME from black liquor derived syngas and putting in place of fuel distribution and filling stations. The production plant is located in Piteå, Sweden, project implementation activities well under way. Roll-out of first truck is in Sept 2009 and BioDME production will start July 2010.

b) Created full-scale production plant concept for the Domsjö biorefinery and pre-qualified the project for $65 million investment grant from the Swedish Energy Agency. The plant will produce 95 000 tonnes per year of BioDME with the capability of also producing green methanol. Total investment cost is approx. $350 million.
c) Accumulated operating time in the 20 tonnes dry solids per day DP-1 pressurized (30 bar, 450 psi), oxygen-blown development unit reached 10 000 hours in June 2009 consistently producing good quality syngas and recovered cooking chemicals. Scale-up activities for the 25 times larger commercial gasifier and gas cooling units are being essentially complete before end of 2009.
d) Launched pilot plant in Pitea.

In September, Chemrec opened it pilot BioDME plant at the Smurfit Kappa paper mill in Piteå, Sweden. This pilot plant is part of the BioDME project where the production of BioDME and its use in heavy trucks is demonstrated.

The syngas generation for the plant is based on Chemrecs black liquor gasification technology. The BioDME synthesis and upgrading technology is provided by Haldor Topsøe A/S. Other important components of the project are the distribution system and the vehicle test fleet.

Chemrec projects that up to one half of all heavy road transportation in Sweden could be run on BioDME, and that enough fuel can be produced from available black liquor feedstock, to supply the needs of one million heavy trucks.The company said that it is ready to start the Front-End Engineering and Design phase for its industrial scale plant at the Domsjö specialty cellulose mill in Örnsköldsvik, Sweden.

Future milestones:

Completing FEED and closing of financing for Domsjö project for start-up early 2013. Develop additional projects in Europe and North America

Business model:

Project development, technology licensing and plant co-ownership.

Fuel cost:

Full fuel cost including capital cost as per RENEW project definition at $2 per gallon diesel equivalent ($1.5 per gallon ethanol equivalent) at the current US SE forest biomass price level. Generally, to get comparable and realistic answers to this question a standardized calculation model is required. There have been many grossly misleading statements on fuel cost circulating, especially in the US, where the numbers have been based on assumptions of negative feedstock costs or unrealistically low capital costs.

Competitive edge:
Well-developed technology with tens of thousands of operating hours in commercial first-generation plants and extensive relatively large-scale pilot tests for pressurized, oxygen-blown. Fuels synthesis is using fully commercial technology from the petrochemicals industry. BioDME plant under erection.

Well-documented low product cost and high GHG reduction (approx. 94%) as documented in open studies by e.g. Princeton university, EUCAR/Concawe/JRC and RENEW.

The technology will enhance value of existing assets and safeguard existing jobs in the pulp and paper industry while investment and operating costs are reduced by shared functions.

Distribution, research, marketing or production partnerships or alliances.
BioDME Consortium for realizing the BioDME project
Haldor-Topsøe, technology cooperation
Alstom, development agreement

Development stage:
- Demo for motor fuels units
- Commercial for first generation air-blown gasifiers

URL: www.chemrec.se

46. Dynamotive

Based in:
13091 Vanier Pl, Suite 140, Richmond, BC V6V 2J1

Year Founded:
1991

Annual Revenues:
2009 [projected], 2008, 2007) 2009 (n/a) , 2008 ($178,106) , 2007 ($0)

Type of technology:
Fast Pyrolysis, Biomass Into GasOil (BINGO) thru Hydroreforming & Hydrotreating stages.

Fuel Type:
BioOil®, BioOil Plus®, CQuest™ Biochar, UBA, UBB

Past milestones:

• Renewable Gasoline and Diesel from Ligno-Cellulose Biomass Produced at Dynamotive's Research Facility in Ontario, Canada

Re: Analysis of Dynamotive Upgraded BioOil® Confirms Gasoline, Jet, Diesel and Vacuum Gasoil Fractions; Proprietary Two Stage Upgrading Process Provides Path to Mobile Fuels from Biomass

• BlueLeaf Inc. and Dynamotive Announce Biochar Test Results CQuest Biochar Enriched Plots Yield Crop Increase Ranging From Six to Seventeen Percent vs. Control Plots

• Dynamotive Receives $260,000 Order for West Lorne BioOil® - The order envisages a minimum of 18 shipments of BioOil®, August 3, 2009.

Future milestones:

• USDA – ARS Study Results (Impact of Biochar on Soil Quality, Crop Yields, Carbon Sequestration, and Water Quality), Late 2009 – Early 2010. Additional tests with BlueLeaf Inc.

• Pilot Plant Completion, Upgrading BioOil thru BINGO process. Third party testing/verification of fuel.

• Announcement of first U.S. project site for BioOil Upgrading plant (commercial/demonstration).

Business Model:
Licensing, Research & Development, Owner/Operator.

Fuel Cost:
BioOil®: Fuel #2 BTU equivalent less 10%
CQuest™ Biochar: Market value currently being developed thru independent trials
UBA/UBB:

Competitive Edge:

• Food vs. Fuel: The Company converts residual biomass from agricultural and forestry operations and/or dedicated non-food crops through a thermochemical process into BioOil and Biochar. BioOil and Biochar plants can coexist with existing forestry and agricultural facilities, providing an additional benefit to operations.

• Yield: Dynamotive's pyrolysis process converts roughly 85% of the total biomass feed into useful solid (char) and liquid (BioOil) fuels. The balance is utilized to provide energy to the process.

• Yields of Diesel/Gasoline from BioOil through the Stage 2 (hydrotreating) upgrading process of 37% have been achieved at bench-scale. The net overall yield from whole biomass to diesel/gasoline is approximately 25%, which to our knowledge is the highest ever reported.

• Scale: Dynamotive's process is projected to be economically viable at 1/7 to 1/15 scale of competing technologies currently known or under development. It is projected that a plant processing under 70,000 tonnes of biomass a year would produce approximately 4,500,000 gallons of renewablegas-oil at under $ 2 per gallon. The scale factor enables distributed production i.e. plants can be developed in diverse locations creating sustainable "green" jobs, while being compatible with agro and forestry operations.

• Flexibility: the two stage process developed by the Company also allows for the opportunity to further upgrade the stage 1 renewable gasoil into diesel and gasoline fuels at a centralized facility or the development of a fully integrated plant if production logistics and economics merit it. This provides for flexibility in development and application.

• Investment: Given the plant scale, the investment required is comparatively low. Approximately $ 33 million will deliver a 15 year production capacity of approximately 67 million gallons of renewable transportation grade hydrocarbon fuels. This is a fraction of the capital cost per gallon and per plant required by proposed competing technologies.

• Time to market; Dynamotive's pyrolysis platform is available today, with plants of 130 Mt and 200 Mt per day completed. The upgrading process uses conventional hydrotreatment equipment and process conditions allowing for rapid implementation at pilot and commercial scale

Distribution, research, marketing or production partnerships or alliances?

Tecna S.A. (strategic engineering partner), Renewable Oil Corporation (Australia)

Development stage:

Pyrolysis technology platform available commercially today, Upgrading BioOil thru BINGO process (bench-scale), pilot plant planned for 2010.

Website
www.dynamotive.com/

47. Terrabon

Company description:
Terrabon, Inc. is bringing cost-effective, sustainable technology solutions to the production of "green," renewable fuels and industrial chemicals.

Address:
20329 State Highway 249, Suite 350, Houston, TX 77070

Year Founded: 1995

Chief Executive Officer and contact email:
Gary Luce

Annual Revenues:
$3 million

Major Investors

- Valero Energy Corporation (NYSE: VLO)
- Waste Management, Inc. (NYSE: WM)

Type of Technology(ies):

- MixAlco™ is an advanced bio-refining technology used by Terrabon's experienced staff of chemical engineers to convert low-cost, readily available, non-food, non-sterile biomass into valuable chemical precursors such as organic acids, ketones and secondary alcohols that can be processed into renewable hydrocarbon fuels.

Feedstocks:

- The biomass used as feedstock includes biogenic municipal solid waste (MSW), sewage sludge, forest product residues such as wood chips, wood molasses and other wood waste, and non-edible energy crops such as sorghum.

Fuel Type:

- Terrabon can produce mixed secondary alcohols (a mix of isopropanol, 2-butanol, 3-pentanol, 2-pentanol, etc), green gasoline, green diesel and green jet fuel. At the moment Terrabon is focusing on producing green gasoline and jet fuel.

Fuel Cost (if applicable - per US gallon):

- Including a conservative $35 per dry ton MSW tipping fee (most areas have a typical tipping fee of around $75 to $100/dry ton MSW) paid to Terrabon, cash conversion costs are estimated in the range of $1.70 per gasoline gallon at a mid-size 5.4 million gallon per year plant. At a large-size 24.5 million gallon per year plant, cash conversion costs drop to below $1.0 per gasoline gallon or below $0.67 per equivalent ethanol gallon.

Offtake partners

- Valero Energy Corporation

Co-products (if applicable)

- Ammonia, ammonium bicarbonate, potable water, organic fertilizers

3 Top Milestones for 2009-10

- Success in winning almost $10 million dollars in state and federal funding has confirmed the company's ability to win competitive grants. Conversely, Terrabon solidified a master research agreement with Texas A&M University and is now helping to fund the institution's research and development initiatives surrounding biofuel technology development.
- Constructed and currently operate a demonstration plant for green gasoline production from various feedstocks, including municipal solid waste, sewage sludge, and non-edible energy crops such as sorghum.
- Constructed and currently operate a fully-functional laboratory facility that is continually expanding in both size and employee population. Currently the facility boasts six full-time scientists and 20 part-time lab assistants.

3 Major Milestone Goals for 2011-13

- Complete data collection from demonstration facility and laboratory R&D needed to perfect present CapEx and OpEx model. .
- Source external funding for Terrabon's first commercial-scale biorefinery on an all equity basis.
- Begin construction of first Terrabon biorefinery of 220-ton per day MSW biorefineries (each with production capacity of 5.4 million gal/year) optimally sited between Waste Management's MSW operations and Valero Energy Corporation's refineries.

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

- Terrabon's business model is based on the transfer of its technology through either joint venture or licensing arrangements. Royalty, engineering, and management fees are charged to licensees or to joint ventures. In the joint venture arrangement, additional development and O&M fees are received, together with the company's share of equity distributions.

Competitive Edge(s):

- *Low Capital Costs* The initial 220 ton per day, 5.4 million gallon per year plant size will cost in the range of $14 to $16 per annual gasoline gallon or about $9 to $11 per equivalent annual ethanol gallon. Large-size 1,000 ton per day, 25.2 million gallon per year plant will cost in the range of $5.5 to $7.50 per annual gasoline gallon or about $3.7 to $5.0 per equivalent annual ethanol gallon.

- *Low Cash Conversion Costs.* Including a conservative $35 per dry ton MSW tipping fee paid to Terrabon, cash conversion costs are estimated in the range of $1.5 to $1.8 per gasoline gallon at a mid-size 5.4 million gallon per year plant. At a large-size 24.5 million gallon per year plant, cash conversion costs drop to below $1.0 per gasoline gallon or below $0.67 per equivalent ethanol gallon.
- *Low-Cost, Readily Available Feedstock.* Feedstock advantage in using sustainable, low cost and readily available feedstock in the form of MSW, primary sewage sludge and urban wood residues as well as set the stage to extend this platform into agriculture waste streams such as corn stover and energy crops such as sorghum.
- *High Energy Recovery.* In the case of MSW, over 72% of the feedstock's energy content survives the conversion processes, even when the undigested residue is not used as a heat source for the process, while mass is reduced by over 60%, enabling low cost product transportation and significantly lower amounts of residual waste destined for landfills; and
- *Reduced GHG Emissions.* In the case of MSW, a reduction of over 150% in lifecycle GHG emissions compared to emissions from traditional transportation fuel pathways can be realized. On the West coast the company believes that its Carbon Intensity index will be significantly below imported sugarcane ethanol from Brazil

Distribution, Research, Marketing or Production Partnerships or Alliances.

- Extensive research partnership with Texas A&M University dating back to 1995
- Feedstock management and supply partnership with Waste Management Corporation
- Product refining and distribution partnership with Valero Energy Corporation
- Catalyst optimization with CRI Criterion Catalyst a wholly own subsidiary of Shell Oil

Stage (Bench, pilot, demonstration, commercial)

- Demo-scale to commercial-scale applications.

Website URL

- www.terrabon.com

48. Fulcrum Bioenergy

Company description:
Fulcrum is leading the next generation of clean, sustainable alternative transportation fuels. The Company is focused on developing, owning and operating environmentally responsible facilities for converting post-sorted municipal solid waste ("MSW") into renewable transportation fuels, renewable electricity and high-value chemicals.

The Company is executing on its unique business model which combines long-term, fixed-price feedstock supplies with demonstrated proprietary technology and long-term off-take contracts to efficiently produce clean, reliable cellulosic ethanol, electricity and high-value chemical products.

With engineering activities underway, feedstock supply and off-take contracts executed and equity financing in place, Fulcrum is aggressively advancing toward the construction of its first project, the Sierra BioFuels Plant. The fully-permitted Sierra BioFuels Plant will be one of the first of its kind projects when it enters operation in 2012 and will be the first of similar, but larger plants that Fulcrum plans to construct throughout North America as part of its expansive development program. Fulcrum's successful development efforts to-date have resulted in the Company securing enough feedstock under long-term, fixed, low-cost contracts to produce one billion gallons annually.

Address:
4900 Hopyard Road, Suite 220, Pleasanton, CA 94588

Year Founded:
2007

Chief Executive Officer and contact email:
E. James Macias

Annual Revenues:
Pre-revenue

Major Investors:

Fulcrum is privately held and financed by US Renewables Group (USRG) and Rustic Canyon Partners (Rustic Canyon). USRG manages a portfolio of renewable power and clean-fuel assets, and Rustic Canyon is one of the largest venture capital firms based in Southern California.

Equity commitments are in place to provide the necessary equity capital requirements of the Sierra BioFuels Plant. In addition, Fulcrum is in advanced stages of discussion and due diligence with other equity investors for additional equity capital to fund the development of the next Fulcrum projects.

Fulcrum has also submitted a Part II application to the Department of Energy under its Loan Guarantee Program for renewable energy projects. The Company is currently in close communications with the DOE regarding its pre-due diligence review of Fulcrum's application for a $70 million loan guarantee for the Sierra BioFuels Plant.

Type of Technology (ies):
Thermochemical process utilizing proprietary catalyst technology.

Fulcrum has demonstrated that its technologies are ready for commercial scale deployment to convert large volumes of post-sorted municipal solid waste into cellulosic ethanol, electricity and high-value chemical products. The Company's unique patent-pending process combines new, innovative technologies with existing commercial systems to provide a clean, reliable high-yield process capable of producing ethanol, diesel, electricity, propanol, butanol and methanol.

Fulcrum's plants will utilize a thermochemical process to convert post-sorted MSW to cellulosic ethanol and other products. MSW received from the feedstock suppliers will be processed through a gasifier where it will be converted to a synthesis gas or "syngas." The syngas will then enter the Company's proprietary alcohol synthesis process where it passes through a catalyst that converts the syngas to fuel grade ethanol and other chemical products. Syngas will also be used to drive turbine generators to produce electricity for the plant.

Feedstocks:
Fulcrum's initial projects have been designed to utilize primarily post-sorted MSW, common household trash, but are also capable of processing plastics, wood and other biomass products.

The Company has created a significant first mover advantage by entering into several, long-term, fixed, low-cost contracts for MSW with large waste services companies across North America. With these contracts, Fulcrum has created a significant and valuable asset – 12 million tons of feedstock annually, providing Fulcrum with the capacity to generate approximately one billion gallons of renewable transportation fuel per year.

These contracts will provide Fulcrum's plants with 20-year feedstock supplies at a fixed-price, which eliminates feedstock supply and price risk for the projects and allows Fulcrum to secure long-term fuel hedges for its ethanol product.

Fuel Type:

Fulcrum's primary fuel product will be cellulosic ethanol. The projects will also generate electricity to provide the power needs of the facilities and to sell to the grid. Fulcrum's unique process is flexible and has the capability to produce other products including diesel, propanol, butanol and methanol.

Fuel Cost (if applicable - per US gallon):

With its unique high-yield process and long-term, fixed, low-cost feedstock supplies, the full-scale production cost of a Fulcrum facility is estimated to be $0.55 per gallon, significantly lower than competing biofuel technologies.

Off-take partners (if applicable)

Fulcrum has signed a long-term off-take agreement for the fuel produced at its Sierra BioFuels Plant with a national fuels marketer. Fulcrum is also in the final stages of negotiation for a long-term fuel price hedge with several financial and strategic entities.

Co-products (if applicable)
Co-products include electricity and high-value chemicals products such as propanol, butanol and methanol.

3 Top Milestones for 2009-10

1. Successfully demonstrated that Fulcrum's alcohol synthesis technology is ready for commercial deployment.
2. Engineering services are underway on Sierra BioFuels through an executed engineering, procurement and construction (EPC) contract with Fluor.
3. Completed significant equity financing to fully fund construction of the Sierra BioFuels Plant.

3 Major Milestone Goals for 2011-13

1. Advance construction of the Sierra BioFuels Plant.
2. Finalize site development activities for the next three Fulcrum projects.
3. Continue to evaluate and test additional emerging technologies that can efficiently convert MSW and other waste products to clean, reliable and economic transportation fuels.

Business Model:
Developer/Owner/Operator

Competitive Edge(s):
Fulcrum has emerged as a leader in the next generation of clean, sustainable alternative transportation fuels by executing on a solid business model that includes the following attributes:

1. Low Cost Producer. Secured feedstock supply under fixed, low-cost arrangements

coupled with a high-yield technology process gives Fulcrum the lowest cost of production in the industry.

2. Demonstrated Technology. Fulcrum has proven that its high-yield ethanol process is ready for commercial development and capable of producing alternative fuels and high-value chemical products.
3. Starting Construction on the First Commercial MSW-to-Fuels Project. The Sierra BioFuels Plant will be the first commercial-scale MSW-to-fuels project in the Nation.
4. Large Development Program. With access to 12 million tons of feedstock throughout North America, Fulcrum has created a significant asset with long-term value capable of producing over one billion gallons annually.
5. Environmentally Responsible Process. Life Cycle Associates provided an analysis of Fulcrum's process, which showed that Fulcrum's ethanol process reduced greenhouse gas emissions by more than 75% when compared to traditional gasoline production.

Distribution, Research, Marketing or Production Partnerships or Alliances.

Stage

Commercial. Fulcrum has demonstrated that its high-yield technology is ready for commercial deployment and is well underway with Fluor on the engineering activities for the Sierra BioFuels Plant. Construction of the facility is targeted to begin by the end of 2010, with commercial operations scheduled for late 2012.

Website URL

www.fulcrum-bioenergy.com

49. SG Biofuels

Company description: SG Biofuels is a fully integrated bioenergy crop company using breeding and biotechnology to develop and produce elite seeds of Jatropha. With the largest and most diverse library of Jatropha genetic material, SG Biofuels is turning the opportunities of Jatropha into reality through a world-class leadership team, leading-edge science and genetics and expertise in agronomy and plantation management.

Address: 11260 El Camino Real, Suite 102, San Diego, CA 92130

Year Founded: 2007

Chief Executive Officer: Kirk Haney

Annual Revenues: WND

Major Investors

Flint Hills Resources, a wholly-owned subsidiary of Koch Industries, Inc., one of the largest private companies in the world, and Life Technologies Corporation (NASDAQ: LIFE), a global biotechnology and synthetic biology leader.

Feedstocks

Jatropha – a sustainable, non-food energy crop

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc)

Renewable diesel, biodiesel, renewable jet fuel

Fuel Cost (if applicable - per US gallon):

SG Biofuels' first elite cultivar, JMax 100, has a production cost of $1.40 per gallon.

3 Top Milestones for 2009-10

- Launched first elite cultivar of Jatropha – JMax 100 with projected yields 100 percent greater than existing commercial varieties and a production cost of july $1.40 per gallon; Launched JMax Jatropha Optimization Platform providing research agencies, growers and plantation developers with access to the company's germplasm library, the genome sequence, molecular markers and advanced biotech and synthetic biology tools to optimize elite Jatropha cultivars for unique growing conditions around the world.

- Completed $9.4 million Series A financing; Strategic partnership and investments representing the complete value chain for crude Jatropha oil production - including Flint Hills Resources, an independent oil refiner and wholly-owned subsidiary of Koch Industries, one of the largest private companies in the world, and Life Technologies Corporation (NASDAQ: LIFE) a global leader in biotechnology and synthetic biology; partnerships with Roundtable for Sustainable Biofuels, Brookhaven National Laboratory, Hawaii Agricultural Research Center;
- Transformational advancements in Jatropha: completed sequence of the Jatropha genome and introduction of hybrid seed production technology to enable the cost-effective scaling of large plantation projects with high yielding and uniform material.

3 Major Milestone Goals for 2011-13

- Drive revenues and establish Jatropha as the next big global row crop through customer acquisitions, strategic partnerships addressing the full value chain and the deployment of profitable institutional-scale plantations.
- Corner the market for elite hybrid seeds of Jatropha through the establishment of a global network of JMax crop optimization centers.
- Pioneer innovations in Jatropha to improve yields and drive production costs from the current $1.40 per gallon to under $1.00 per gallon within the next three years.

Competitive Edge(s):

SG Biofuels has driven considerable advancements in Jatropha that have significantly increased yield, reduced production costs and enabled the development of a viable value chain for the production and distribution of crude Jatropha oil.

While the market has been excited about the potential of Jatropha, most investments have been small and/or focused not on the genetic improvement of the crop, but rather on the planting of unimproved cultivars. In addition, the early growers of Jatropha have been disappointed in yields, because no attention was made to proper germplasm selection or proper agronomic trials. SG Biofuels recognized this mistake and chose to focus very quickly on the domestication or genetic improvement of the crop, while simultaneously investing in areas that would be needed for downstream commercialization. Germplasm, breeding and biotechnology are the key technology differentiators for the company in that they have provided the foundation for increasing yields and reducing production costs.

Key competitive advantages include:

- Introduction of JMax 100 with a production cost per gallon of just $1.40/gallon ($58/barrel)

- A fully-integrated platform providing upstream and downstream expertise, led by partnerships and investments from Life Technologies Corporation and Flint Hills Resources.
- Development of the world's largest collection of Jatropha genetic material, including 6,000 unique genotypes gathered from the center of origin for the plant in Central America.
- The JMax Jatropha Optimization Platform enabling the adaptation of elite cultivars for Jatropha for growing conditions around the world.
- A completed sequence of the Jatropha genome, accelerating the identification and development of key traits.
- The introduction of hybrid seed production technology, resulting in significantly greater yield, uniformity and vigor while reducing handling and deployment costs for plantation developers.

Distribution, Research, Marketing or Production Partnerships or Alliances:

SG Biofuels understands that success with Jatropha, as with other commercial agricultural row crops, requires that the complete value chain is addressed – from project financing to crop science, plantation development and management to harvesting and processing, and refining all the way through the ability to sell into an existing global market for crude Jatropha oil.

The Jatropha industry and its growers have historically been plagued by significant gaps in the value chain. SG Biofuels has formed and leads an exclusive network of partners to align the capabilities of industry leaders throughout the entire value chain with the needs and requirements of major purchasers of crude plant oil.
Through these partnerships, SG Biofuels has addressed the gaps in the Jatropha value chain, creating a pathway to success for growers and plantation developers and enabling the production of large volumes of low-cost crude plant oil to meet the growing demand for renewable diesel, biodiesel and renewable jet fuel.

Key partnerships include:

- Life Technologies Corporation
- Flint Hills Resources
- Danforth Plant Science Center
- Hawaii Agricultural Research Center
- Brookhaven National Laboratory
- Roundtable on Sustainable Biofuels

Stage

Commercial

Website URL

www.sgbiofuels.com

50. Inbicon

Based in:
Denmark

Annual revenues
N/D

Type of technology:
Cellulosic ethanol from wheat straw via enzymatic hydrolysis.

Type(s) of fuel produced:
Ethanol

Major investors.
Statoil, DONG Energy

Past milestones:

- Opened 1.3 Mgy pilot plant in Kalundborg, Denmark in 12/2009.
- Inbicon has commenced shipping cellulosic ethanol to Statoil with a 8,00 gallon (28,500 liter) delivery from the Inbicon's demonstration plant at the Asnæs powerplant in Kalundborg. Overall, Statoil has bought the first five million litres of Inbicon second generation bio ethanol, produced from wheat straw and other agricultural and forestry waste, using enzymes from Novozymes. Statoil, which began offering biogasoline to motorists in 2006, is now also blending under a mandate passed by the Danish parliament in 2009.

Future milestones:

- Projects announced in North Dakota and China.

Business model:

Licensor.

Fuel cost:
N/D

Competitive edge:
First mover.

Development stage:

Commercial.

Website URL
www.inbicon.com

Other companies of note

Advanta India

Company description: Hybrid Seed Company

Address: Hyderabad, India

Year Founded: 1986

Chief Executive Officer and contact email: Mr. Ram Kaundinya

Annual Revenues: $ 700 million

3 Top Milestones for 2009-10: Introduction of Sweet Sorghum for Ethanol product line.

3 Major Milestone Goals for 2011-13 : To be No. 1 in short duration energy crop

Business Model: We extend technology support to the entrepreneurs by supping high yielding hybrid short duration seeds.

Stage: Good commercial and technical field team

Website URL www.advantaindia.com

Albemarle Corporation

Company description:

Manufacturer of Specialty Chemicals

Address:
451 Florida St, Baton Rouge, LA 70801

Year Founded:
1994. Albemarle was formed in 1994 as a the specialty chemicals spin off from Ethyl Corporation.

Chief Executive Officer and contact email:
Mark Rohr

Annual Revenues:
2009 @ $2.0B; 2010 @ $2.3B (est.)

Major Investors:
ALB NYSE

Type of Technology(ies):
Catalysts, Polymer Additives, Fine Chemicals. Subcategories for catalysis include catalysis for the production of Biofuels from a wide range of feedstocks, including second generation materials like wood, municipal waste, agricultural residue, and algae.

Feedstocks:
The catalytic technologies being developed for the conversion of 1^{st} and 2^{nd} generation feedstocks will be able to handle a wide variety of raw materials. The focus of the developments for the next generation of catalysts is directed at using renewable carbon sources that are not in competition with food.

Fuel Type (if applicable):
The heterogeneous catalytic technologies being developed by Albemarle and her partners are directed at the production of fungible fuels. This means the products can be mixed in any percentage with traditional fuel types. Albemarle's researchers are targeting all types of fuel to be derived from renewable sources, so for example gasoline, diesel, aviation fuel and fuel for stationary power units are being developed. As this is still in full development, current processes producing FAME and ethanol are also under study.

Fuel Cost (if applicable - per US gallon):
A major target for the researchers of Albemarle is to create technology that will produce renewable fuels at a competitive pricing. At the moment, we consider all developments that start being economically attractive from a crude oil price around 70-80$/bl to be worthwile.

Offtake partners (if applicable):
We are the world's largest supplier of heterogeneous biofuel catalysts, as we are the co-developer and sole supplier of the Neste NExBTL units. We are also the leading catalyst developer in many consortia, notably the recently awarded DoE-funded NABC program. Next to these, we have many flourishing partnerships, unfortunately these often have a confidential nature.

Co-products (if applicable):
In the development of our catalysts, we closely adhere to the principles of Green Chemistry and Sustainable Business Practices. The products we develop are based on relatively benign chemistry and chemicals. Most catalytic materials are inorganic, and easily recyclable. From the earliest conception of catalyst development, the production, use, and disposal are taken into consideration.

3 Top Milestones for 2009-10

1. Largest global catalyst supplier to the biorefining market
2. New heterogeneous transesterification catalyst
3. New mixed alcohol catalyst production process for cellulosic biorefineries

3 Major Milestone Goals for 2011-13

1. Improved catalyst for catalytic pyrolysis
2. Improved catalyst for pyrolysis oil upgrading
3. Improved catalysts for (bio)Syngas upgrading into hydrocarbons or alcohols
4. Improved NExBTL catalyst

Business Model:
Together with partners or in consortia we are developing heterogeneous catalysts that are essential to convert biomass into usable transportation fuels. Once a catalyst has proven its usability in a certain process we manufacture the catalysts for our partners.

Competitive Edge(s):
With over 50 years of experience in developing and manufacturing catalysts. Albemarle is leveraging its extensive knowledge of catalysis, catalyst preparation and production into the Biofuels arena. Tooled with state-of-the-art equipment like High Throughput Experimentation and analysis tools, Albemarle is well poised to quickly and efficiently develop and commercialize catalytic routes to renewable fuels from non-fossil carbon sources.

Distribution, Research, Marketing or Production Partnerships or Alliances. Includes, but not limited to:

1. Neste – Production
2. NREL led NABC Consortium
3. PNNL led consortium
4. EERC – Research
5. Velocys – Research
6. Biomass Technology Group (BTG) - Research
7. JDA with major US based oil refiner and biomass provider. (Confidential)

Stage:
Albemarle operates in all the aforementioned stages with respect to catalysis.

Website URL: **www.albemarle.com**

Alkol

Based in: 2711 Centerville Avenue Suite 400 Wilmington DE 19808

Year Founded: In Brazil in 1994. In the US in 2009

Annual Revenues: N/A

Technology: Automobile ethanol conversion systems

Fuel type: N/A

Major investors: Self-funded

Past milestones
1 - Start operations in the US (achieved), 2 - Make media noise (achieved), 3 - Raise VC attention (achieved)

Future milestones:
1 - Develop US and Europe distributor dealership, 2 - close US$2 million in funding, 3 - close deal with US government to convert its fleet

Business model: Owner

Fuel cost: N/A

Competitive edge: 1 – 30 YEARS EXPERIENCE. The others have at best 3 years. 2 – TRANSPARENT to the end customer. The others require the user to install it himself and for that he needs to inform the fuel injector connector type, for example 3 – COMPLETE SOLUTION that will work with any car in any weather. The others depend on the installation of extra gasoline tanks for cold starts and are subject to sudden acceleration failures due to unhandled improper compression rates 4 – TOTALLY AUTOMATED. The others require the driver to choose a setting that either only works at idle or a high speeds (never both) 5 – EXCELLENT PRICE MARGINS. Because it is made in Brazil, where salaries are low, it's much cheaper than the US solutions **Alliances and**

Partnerships: In the process of closing down with a major fuel pump chain which will install our system in their facilities with personnel trained by us

Development stage: Over 2000 units sold in Brazil the past 2 years. Fully mature technology employing Brazil's 30 years of ethanol technology

Website: www.1hourflex.com

Allard Research

Based in: 16276 County Road 616, Farmersville, Texas 75442

Year Founded: 2008

Annual Revenues: $1.1 MM

Technology: Ethanol Mini-Refineries

Fuel type: Ethanol

Major investors: Self-Funded

Past milestones:
Shipping World's first ethanol mini-refineries, Computer controlled ethanol boiler systems, Modular ethanol systems

Future milestones:
Cellulose front-end processor for mini-refineries, Feedstock sugar concentrators, Waste water cleanup systems

Business model:
Privately Owned

Fuel cost:
Varies by feedstock used

Competitive edge:
Standard components and production-line approach to lower cost, improve quality.

Development stage:
Commercial

Aquaflow Bionomic

Based in: New Zealand

Business:

Aquaflow has developed technology to harvest wild algae from municipal sewage ponds, farm outflows or rivers. Aquaflow's manufactures 40-feet containers which can be deployed in remote locations, and scaled. The company's approach avoids upfront capital costs of other algae-based fuel technologies based on development of monocultures, ponds or bioreactors.

Model:

Sale of equipment and remediated water sales. Interestingly, the company's investor projections do not include revenue from the sale of green crude or carbon credits. However, the company has said that it can charge royalties, and produce revenue from the algae feedstock, green crude and other products that result from its process.

Past milestones:

1. The company has been running a pilot plant at the Blenheim District Sewage ponds in and has produced 40 tonnes of algae to date. As early as March '08 the company said that it had achieved commercial-scale algae harvest levels at its plant in Marlborough, and said that its new bioreactor installations were expected to bring the company to commercial-scale production of biocrude "within the next few months".

2. By September '08, Aquaflow said it had produced its first batch of commercially competitive green crude oil made from algae oil. The crude oil product is made from wild algae grown on human sewage. Company executives said that the development was significant because the company could separate fuels such as diesel fuels, aviation fuels, and high-value chemicals, from a green crude product.

3. In October 2008, Aquaflow signed a partnership with Honeywell UOP to provide algal oil for conversion to drop-in jet fuel.

4. In July '09, Aquaflow and Solray Energy announced a partnership that will join Aquaflow's technology for harvesting algae grown in wastewater to Solray's algae to fuel conversion process. Solray, in turn, is a joint venture between solvent recovery firm Solvent Rescue and heating equipment manufacturer Rayners. At present, Solray converts about one-third of the algal biomass to bio-crude, but is researching improvements to its process.

5. Pure Power invested $3 million for a 19.9 percent stake in the company.

Future milestones:

1. Aquaflow Bionomics announced in August '09 that it has commenced a $2.09 million capital raise in Australia, the last private raise before an IPO expected in the next 12 months. It's IPO will float 60 million shares and is expected to raise $20-$30 million. The company said it will use the funds to invest in R&D for its continuous flow algae production technology, which focuses on water remediation as well as fuel production. The company operates a prototype algae production facility in Blenheim, and has successfully tested harvest of wild algae.

2. Aquaflow said it is in discussions with 16 projects on three continents, including with municipal authorities and the private sector.

Metrics:

Aquaflow's investor presentation includes forecast revenue of $4.4 million in 2010/11, rising to A$94.4m in 2014/15.

Avantium

Company description:
Avantium is a leading technology company specialized in the area of advanced high-throughput R&D. The company develops and commercializes YXY – its brand name for chemical building blocks for making green materials and fuels that can compete on price and performance. Avantium has demonstrated the value and commercial potential of its unique technology and knowledge by collaborating with leading companies in the energy and chemical industries. Avantium has a global customer base for its profitable R&D services and systems offering, including market leaders such as BP, Shell and Sasol. Avantium offices and headquarters are based in Amsterdam, the Netherlands.

Address:
Zekeringstraat 29, 1014 BV, Amsterdam, The Netherlands

Year Founded:
2000

Chief Executive Officer and contact email:
Tom van Aken, CEO Avantium, tom.vanaken@avantium.com

Annual Revenues:
2007: EUR 10 million / USD 14 million

2008: EUR 12 million / USD 17 million

2009: not disclosed

Major Investors *(if a public company, please provide trading symbol and exchange).*
Aescap (Netherlands), Capricorn (Belgium), DFJ Esprit (UK), ING (Netherlands)

Type of Technology(ies)
Chemical catalysis

Feedstocks:
Carbohydrates from various types of biomass

Fuel Type:
Furan-based fuel components for diesel, jet fuel and gasoline

Fuel Cost (if applicable - per US gallon):

EUR 1.2 - 1.5 (USD 1.7 – 2.1) per Gallon Diesel Energy Equivalent (corrected for energy content of regular diesel)

Offtake partners (if applicable)

Co-products (if applicable)

3 Top Milestones for 2009‐10
1 Construction pilot plant
2 Proven application potential for YXY polyesters: bottles, fibers and film
3 Results of engine tests (diesel trucks and jet engines)

3 Major Milestone Goals for 2011‐13
1 Construction of semi-industrial plant
2 Joint development partnerships for YXY materials and chemicals (bottles, fibers, coatings, engineering plastics, plasticizers)
3 Extensive engine test programs in partnership with automotive and fuel companies

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)
Current status: Avantium is the exclusive owner of its proprietary YXY technology to produce chemical building blocks for making green materials and fuels.

Avantium is looking for partners that can produce YXY building blocks on industrial scale, whereby Avantium will be the *technology licensor*.

Competitive Edge(s):
The current process yield of Avantium's YXY technology will allow competing on basis of price and performance with oil-based chemicals and fuels.

Avantium's catalytic process has a number of economic benefits: short reaction times, it can be produced at very large scale, and it has a natural fit with existing installations and infrastructure of the petrochemical industry. All these benefits allow for competing on the basis of price.

Avantium has proven that materials and fuels containing YXY building blocks have excellent properties and unique benefits that enable them to compete with oil based products on basis of performance.

Distribution, Research, Marketing or Production Partnerships or Alliances.

Joint Application Development Agreements with: NatureWorks (polyesters), Teijin (high-performance polymers) and DAF Trucks (engine testing of fuels).

Feedstock: partnerships with Royal Cosun (agricultural waste streams) and ECN (Energy Research Center Netherlands (pretreatment of lignocellulosic biomass)

Life cycle assessment: Utrecht University (Patel, Faaij):

Stage (Bench, pilot, demonstration, commercial):
Pilot

Website URL www.avantium.com, www.yxy.com

Balboa Pacific

Based in: San Diego, California

Business:
Balboa's "Green-Loop System" is the world's first waste to electricity "AND" biofuel system utilizing pyrolytic gasification. This game changing, zero waste system generates numerous environmentally beneficial by-products from any organic waste!

Balboa Pacific's unique proprietary patented continuous-feed pyrolytic gasification waste treatment machine (the Bal-Pac) is capable of reducing the volume of ANY organic waste up to 95%, while producing recyclable and resalable by-products from the thermal destruction of ALL organic waste including: municipal solid waste, construction and demolition waste, used tires, biomass, animal waste, agricultural /agribusiness waste, forest waste, landscape waste, industrial waste, hospital waste, oil sludge, sewage waste, hazardous and toxic waste etc. Balboa's pyrolytic gasification process is exceptionally clean, with emissions that are 99.999984% free of any dioxins, furan, smoke or soot while creating an inert, environmentally beneficial and usable by-product carbon char (an effective soil additive that retains moisture and nutrients while slowly releasing them into the soil). Bal-Pac's are modular, scalable (50-500tons per day) and mobile.

Unlike incinerators or other combustion technologies, Balboa's technology does not convert all organic matter into harmful CO2 emissions. Instead, pyrolysis, which is the destructive distillation of organic materials without oxygen, allows a significant fraction of the organic waste to be converted into carbon char, which is a form of activated carbon that absorbs moisture and nutrients, and thus qualifies as an effective way to sequester carbon. Accordingly, carbon char is both, a very useful soil additive for agriculture and a material that qualifies for carbon credits. Even though the United States is not a signatory of the Kyoto protocol, carbon credits are publicly traded worldwide and their value fluctuates around $18/ton of CO2 (i.e., about $66/ton of carbon).

Model:
Balboa will undertake a project specific, strategic approach to deliver its integrated systems to market. Balboa plans to build and operate its system on a project-specific basis, enter into joint ventures, build, operate and transfer, earning fees prior to transferring ownership, selling its systems outright, or on a royalty basis, when and where required.

Past milestones:
- Numerous domestic and foreign patents issued with proprietary knowledge.
- A 50 ton per day machine was constructed, funded by Southern California Gas and private investors. Total investment: approximately $2.5 million dollars.

- Machine operated at California Steel for 18 months. During that time, numerous leading independent environmental companies like Dames & Moore (now owned by URS), Sandia Laboratories, Pacific Environmental Services, etc., tested and monitored emissions and char and without exception concluded that the Bal-Pac pyrolytic gasification process complies with all standards set by the US EPA and the world's highest standards set by southern California's AQMD. "Balboa's Pyrolytic Gasification destroys 99.999984% of the toxic elements found in ANY feedstock that was introduced through the System and is cost effective in its application to waste management." (URS study on website)
- In 2002 Balboa entered into a manufacturing agreement with Alstom Power Inc.

Future Milestones:

- Balboa is currently in project specific negotiations with several private and governmental organizations both domestically and internationally.
- Domestically, one of the largest C&D recycling facilities will recognize substantial new revenue from the conversion of material once landfilled. The C&D facility owners are in negotiations with investors about replicating this C&D system at 30+ sites.
- The State of California is particularly interested in Balboa's "Green Loop System" after discussions took place in Sacramento. California has energy and biofuel mandates Balboa's technology will help California achieve.
- Balboa's shovel ready waste to energy used tire project is currently seeking funding. This $5MM project has a 50% ROI!
- Because of NDA agreements in place, details about any international and some domestic projects cannot be revealed. Numerous projects, in addition to those mentioned above, are waiting to enter into negotiations with Balboa, once our proven technology has been in operation on a commercial basis.

Metrics:

The Bal-Pac is an excellent waste-to-energy machine. Balboa views landfills as oil companies view oil reserves, only Balboa will extract clean energy from the overflowing, energy rich landfills. Bal-Pac's improve global health by converting waste into clean electricity, reducing methane release from landfills (GHG), sequestering carbon, producing carbon char, and biofuel while generating substantial carbon credits.

Waste is a $500 billion/year business worldwide primarily divided between landfills, incinerators and hauling services. Landfills are at maximum capacity with no municipality yearning for a new one in their backyard and incinerators are being phased out due to how dirty and expensive they are to operate. Balboa's objective is to participate in the waste business by extending the life of all landfills indefinitely as well as replacing incinerators with Bal-Pac's. Additionally, by placing Bal-Pac's within waste transfer stations - waste could be reduced by up to 95% reducing the amount of waste requiring transport. Fewer trucks reduce transportation costs, the amount of vehicles on the road and exhaust pollution.

Biofuel Advance Research & Development (BARD)

Company description:
Algae Biofuel Company

Address:
1167 Bridge Street, Philadelphia, PA 19124

Year Founded:
2007

Chief Executive Officer:
Surajit Khanna

Annual Revenues: n/a

Major Investors:
BARD has filed its S-1 Registration statement with the SEC and is waiting for it to be "Effective"

Type of Technology(ies)
Closed loop system/Photobioreactors

Feedstocks:
Algae (multiple strains)

Fuel Type
Focus is currently biodiesel, investigating jet fuel opportunities

Fuel Cost (if applicable - per US gallon): *N/D*

Offtake partners (if applicable) FC Stone, Omega Seafoods

Co-products (if applicable) Algae oil, cake, oxygen, glycerin

3 Top Milestones for 2009-10 (1) Received Algaepreneur Award from the National Algae Association (2) Received Air Quality Permit from the Department of Environmental Protection – Pennsylvania (3) Q4 expectation is to begin production of algae on a commercial scale, anticipated output of 48,000 gals/month.

3 Major Milestone Goals for 2011-13 (1) Completion and full production from 3 mgy facility in Q2 2011 (2) Completion and full production from 66 mgy facility by Q1 2012

Business Model: owner-operator, with focus on large scale production

Competitive Edge(s): Patent pending production process utilizing PBRs in a closed loop system, optimal location of facilities (co-located adjacent to both CO2 source and municipal waste water plant as well as next to a deep water port), scalable turnkey solution

Distribution, Research, Marketing or Production Partnerships or Alliances.

Stage Demonstration with cross over to commercial in Q4

Website URL www.bardholding.com

Bioalgene

Based in: Washington State

Business: Bioalgene cultivates algae to remediate pollution, and to produce fuel and other bioproducts. The company has developed proprietary methods to accelerate algae growth, has proven those at pilot level in a coal-fired generating environment, and is developing distinctive approaches to harvest and convert algae. It is a participant in multiple consortia seeking development and commercialization projects and grants.

Bioalgene is focused on cultivating algae to remediate pollution and produce bioproducts, including fuel. The company has developed proprietary methods to accelerate algae growth and is developing distinctive harvest and conversion systems.

The vision that draws research scientists, entrepreneurs and investors to algae remains as important as ever: to replace a significant portion of petroleum fuels with the next generation of renewable alternatives. Bioalgene has developed phased processes to:

- Use algae to capture and convert air pollution -- particularly greenhouse gases
- Create profitable products from organic wastes
- Farm on a large scale in locations where raw materials are produced as wastes.

Bioalgene's cultivation strategy is designed to minimize capital requirements and operating costs. Enroute to producing fuel, Bioalgene captures and converts CO2 today to generate voluntary carbon credits at high-volume industrial CO2 sources.

The company has grown algae in a production environment, and accomplished fourfold growth acceleration using a proprietary approach that included flue gases from a coal-fired power plant.

Bioalgene's strategic advantage to high-volume greenhouse gas producers include:

- Volume capture at low cost
- Anticipatory carbon credits
- Products from pollutants.

The company creates value for customers and investors in three stages:

- Earning carbon credits from large-scale CO2 capture
- Producing fuel and products from algae grown at several facilities
- Producing and selling high-volume algae production systems.

Bioalgene's approach to algae farming meets economic and environmental criteria, even in the midst of the recession. Plans include multiple sites growing high volumes of dense algae, using Bioalgene's strains, equipment and end-to-end systems. The company's triple-bottom-line global opportunity results from carefully planned and leveraged resources that provide substantial multipliers.

Model:

Project developer, strategic partner, service provider.

Past milestones:

1. Bioalgene's initial work to prove growth methods and economics engaged partners from Washington State University and Seattle University.
2. Under a grant from Boeing, proved strain viability, growing conditions and yields from dozens of regional algae strains.
3. Demonstrated volume, high-yield growth in open-ponds.
4. Established its R&D center in Eastern Washington.
5. Farmed algae in a production environment, accomplishing a fourfold acceleration in growth using flue gases directly from a coal-fired generating plant.

Future milestones:

1. Engineering and pilot phase expected in 2010 for a major Midwest industrial emitter of greenhouse gases. Algae will be used to capture and convert CO2 and other pollutants.
2. Scale up algae production systems at the coal-fired generating plant where Bioalgene has previously captured CO2 and other GHG from flue gases in algae.

Metrics:

Based on our testbed and production level work, Bioalgene expects to convert each million pounds of CO2 into more than 10,000 gallons of fuel feedstock and 500 tons of bioproducts.

BioFuelBox

Based in: 50 Las Colinas Lane San Jose, CA 95119

Year Founded: 2006

Annual Revenues:

~$1M 2009 $0 2008 $0 2007

Technology:
Supercritical biodiesel production from waste fats, oils and greases

Fuel type:
Biodiesel

Major investors:
Element Partners
Draper Fisher Jurvetson

Past milestones:
Scale technology 100x with first commercial plant
Produce premium biodiesel from true waste material (trap grease, DAF, etc.)
Sign up major fuel partner for off-take

Future Milestones:
Roll-out additional waste-to-fuel plants
Optimize plant design and costs
Continue to qualify new waste feedstocks

Business model:
Owner/Operator

Fuel cost:
Competitive with petroleum diesel

Competitive edge:
Technology – when 90% of a gallon of biofuel is the cost of the feedstock, having a technology that can convert waste into fuel is imperative.

Business model – waste generators do not wish to become fuel experts, they just want to rid themselves of the waste and save money at the same time. BioFuelBox is a one-stop shop for their waste remediation.

Alliances and Partnerships:
Research – some technology licensed from US DOE

Development stage:
Commercial

Website: www.biofuelbox.com

BioMCN

Based in: Netherlands

Business: Purification, evaporation and cracking (of crude glycerine) to obtain syngas which is used to synthesise bio-methanol

Past Milestones:

March 2008: proof of principle in our 20.000 t pilot plant,
October 2008: winner European Responsible Care Award,
July 2009: successful start-up commercial 200.000 t plant

Future milestones:

1. Selling bio-methanol on a large scale
2. Expanding current capacity,
3. Developing new technologies (possibly different feedstock)

Model: Owner-operator.

Quotable quotes:

"The only company in the world to produce bio-methanol on a commercial scale. The solution to comply with biofuels regulations, chemically identical to regular methanol, great performance as a fuel."

Bionavitas

Based in: 8469 154th Avenue NE, Redmond, WA 98052

Business:
Bionavitas, based in Redmond, Washington, has developed Light Immersion Technology that enables the rapid, cost-effective production of algae for environmental remediation, manufacturing health and nutraceutical products, and producing biofuels.

Model:
Algal fuel developer and R&D partner in remediation and light immersion.

Past milestones:

In 2009, algae-to-energy pioneer Bionavitas unveiled its patent-pending Light Immersion Technology that dramatically increases algae yields in a cost-efficient and scalable model.

Light Immersion Technology employs a system of light rods which extend deep into the algae culture. In external canal systems, the rods distribute light from the sun into the culture. This abundant and free energy source is ideal for generating large amounts of algae for use as biofuels. In closed bioreactors, the rods evenly distribute more readily absorbed red and blue spectrum light from high efficiency LEDs. While the LEDs increase the cost of production, algae grown in these systems are used for higher value markets such as nutraceuticals.

Future milestones:
In 2009, Blue Marble Energy and Bionavitas announced a partnership in which Blue Marble Energy will produce high-margin biochemicals from microalgae supplied by Bionavitas.

CEO Michael Weaver has said that the company is looking at a site in Eastern Washington as well as throughout the Southwest for a location for its pilot-scale plant.

Metrics:

The Light Immersion Technology developed by Bionavitas fundamentally changes this equation by enabling the algae growth layer in open ponds to be up to a meter deep. This represents a 10 to 12 time increase in yield over previous methods that produced only 3-5 centimeters of growth.

Website:
www.bionavitas.com

Bioprocess Algae

Company description:
BioProcess Algae, LLC is focused on fulfilling needs in the transportation fuels and animal feed industries for cost competitive alternatives with favorable carbon balances.

Address:
45 Highpoint Avenue, Portsmouth Business and Technology Park, Portsmouth, RI 02871

Year Founded: 2008

Chief Executive Officer:
Tim Burns

Annual Revenues:
N/A

Major Investors:
Green Plains Renewable Energy (NASDAQ: GPRE), CLARCOR (NYSE: CLC), NTR, & BioprocessH2O

Type of Technology(ies):
Attached growth technology for autotrophic, mixotrophic and heterotrophic production of algae and metabolites.

Feedstocks: Flexible platform allows for efficient conversion of carbon dioxide or sugars to algae.

Fuel Type (if applicable):
Flexible production platform is not fuel specific. Initial focus is on biodiesel and ethanol leveraging existing local infrastructure.

Fuel Cost (if applicable - per US gallon):
Establishing in Phase II

Offtake partners (if applicable)
Establishing in Phase II

Co-products (if applicable)
High Value and High Protein for the Feed Markets

3 Top Milestones for 2009-10
Successfully scale-up demonstration at GPRE-owned ethanol plant in Shenandoah, IA with

Grower Harvesters™ bolt-on technology tied into flue gas emissions and waste heat from host ethanol plant. Construction of larger demonstration facility currently underway.

"During Phase I, Bioprocess Algae has successfully demonstrated the scalability of the technology with a 40 times increase in growing volume from bench scale reactors to an industrial setting at our ethanol plant in Shenandoah, Iowa," said Todd Becker, President and Chief Executive Officer of Green Plains Renewable Energy. "We have experienced 100% uptime since inoculation in October 2009 and continue to harvest algae on a daily basis. With the positive results we have achieved in Phase I, we will commit additional resources and expertise to rapidly build the next phase of this exciting project. Our vision remains the same of providing a solution to sequestering industrial carbon dioxide while producing a high quality feedstock for fuel and feed."

"We are also excited to announce that the Iowa Power Fund Board of Directors has unanimously voted in favor of awarding the project an additional $2.0 million matching grant," added Becker. "This is the first time that the fund has participated in a second round of funding and we truly appreciate the vision and commitment of the Iowa Power Fund.

3 Major Milestone Goals for 2011-13

Complete demonstration efforts in Shenandoah, IA. Secure off-take agreements for biofuel and co-products. Begin construction of first commercial facility(ies) in Shenandoah in 2011.

Business Model:

Bioprocess Algae technology is being developed for seamless integration with ethanol plant design and other industrial CO2 emitters. Revenue will be generated through technology licensing, royalties and operational support. Bioprocess Algae's development arm will raise capital to facilitate construction and operation of farms by both Bioprocess Algae and licensees.

Competitive Edge(s) & Distribution, Research, Marketing or Production Partnerships or Alliances:

The technology at the heart of Bioprocess Algae's Grower Harvester™ is a unique high surface area, biofilm-based approach to enhance light penetration, productivity, harvest density and gas transfer. The Grower Harvester™ technology is a flexible platform that allows for economical production of biomass and secreted metabolites produced under autotrophic, mixotrophic or heterotrophic conditions.

Green Plains is a vertically-integrated ethanol producer based in Omaha, Nebraska. They currently have an ethanol production capacity of approximately 657 million gallons per year with our 8 plants located in Bluffton, Indiana, Central City, Nebraska, Lakota, Iowa, Obion, Tennessee, Ord, Nebraska, Riga, Michigan, Shenandoah, Iowa and Superior, Iowa.

CLARCOR is a $2 billion+ & 100+ year old U.S. based company that is the most diverse filter company in the world. NTR plc, the international renewable energy group, builds and runs green energy and resource-sustaining businesses.

Stage
Commercial

Website URL
www.bioprocessalgae.com

Blue Marble Energy Corp. / Blue Marble Biomaterials

Company description: Blue Marble Biomaterials' (BMBM) proprietary system utilizes non-genetically modified bacteria in a modified form of anaerobic fermentation. This process breaks down any type of cellulosic, lignin and protein feedstocks to produce a broad portfolio of renewable chemicals as well as biomethane, biohydrogen, and nitrogen compounds.

Address: PO Box 9190, Seattle, WA, 98103

Year Founded: 2007

Chief Executive Officer and contact email:
Kelly Ogilvie

Annual Revenues:

2011 projection: $1+ Million

Major Investors:
100% private equity.

Type of Technology(ies)
Advanced fermentation, naturally hybridized bacteria, distillation, supercritical extraction (for flavoring)

Feedstocks:
Cellulosic, lignin, protein. All separated and blended before use.

Fuel Type (if applicable): N/A

Fuel Cost (if applicable - per US gallon): N/A

Offtake partners (if applicable):

- <u>Major US Flavoring House (MOU stage):</u> In late September, BMBM signed an MoU with a major US flavoring house that intends to purchase Blue Marble Biomaterials' sustainable and natural biochemical ingredients in Q1 2011. The agreement also shows intent for the flavoring house to lend expertise to bring Blue Marble's processes to food quality standards. Blue Marble will officially announce the name of the partner in late October or early November.
- <u>Major Chemical Distributor (MOU stage):</u> In late September, BMBM signed an MoU with a global chemical distributor. This distributor will be the first to offer

several of Blue Marble's sustainable biochemicals alongside traditionally produced petrochemicals. Blue Marble will officially announce the name of the partner in late October or early November.

Co-products (if applicable):
Our biochemicals are drop-in replacements to petrochemicals, requiring no change in process for our customers. We anticipate commercial delivery of our products to our customers by the end of Q1 2011. List of currently available chemicals is available in the attached document. Our co-products include anhydrous ammonia, soil amendment and methane.

3 Top Milestones for 2009‑10

1. Beginning construction on a biorefinery in Corvallis, MT that processes 100 tons of cellulosic, lignin and protein based biomass per month.
2. Signed Memorandum of Understanding with major US flavoring house, signaling intent to buy product at market price.
3. Signed Memorandum of Understanding with global chemical distributor to buy and supply several Blue Marble renewable biochemicals on a global platform.

3 Major Milestone Goals for 2011‑13

1. Bring 100 ton / month facility in Corvallis, Montana online in Q1.
2. Transact over $1 million in sales for MoU offtakes and other clients.
3. Finance and site 1000 ton / month facility.

Business Model: owner-operator, technology licensor.

Competitive Edge(s):
BMBM currently has no direct competition for our targeted portfolio of biochemicals. Our primary competition are petrochemical companies. This industry is dominated by Dow Chemical, BASF, and fermentation manufacturers of chemicals in Europe.

- **Sustainably Produced Products**: Our production process uses waste biomass as feedstock and will eventually be powered primarily by methane generated by the process itself;
- **Feedstock:** We can use a wide variety of inexpensive and readily available feedstock, includingn agricultural and municipal wastes;
- **Low Cost of Production:** Our cost of production is much lower than costs involved with petrochemical refining in part due to low feedstock costs and our refining technologies;
- **Low Volume; Distributed Model:** We can site our production facilities at or near our customers' facilities;
- **Margin Stability:** Our margins at scale are large enough to withstand extreme market volatility;

- **First Mover Advantage:** We will be the first company to develop specialty biochemicals for food and fragrance on a commercial scale; and
- **Proprietary Position:** BMBM has patents filed for its system processes. BMBM will maintain the intellectual property of its hybridized bacterial consortia in much the same way as Coca-Cola protects its formulas as a trade secret.

Distribution, Research, Marketing or Production Partnerships or Alliances:

- **Production Partnerships**
  Under memorandums of understanding in our MoUs, Blue Marble will form partnerships with these companies to achieve quality control, quality assurance and food grade standards in the 100 ton per month Corvallis, MT biorefinery. These partnerships will give Blue Marble a strong advantage in food, cosmetics and pharmaceutical markets that require strict quality control measures.

Stage: commercial

Website URL: www.bluemarblebio.com

Carbon Green

Based in: Illinois

Business:
Carbon services provider and ethanol operator.

Model:
Owner-operator.

Past milestones:
In 2008, Carbon Green said it expects to significantly increase carbon credit grants for US ethanol plants, following the first grant of credits to the 44 Mgy Corn Plus facility in Minnesota. The Corn Plus plant in Minnesota burns corn syrup to offset fossil fuel use, and uses two wind turbines for electricity.

Future milestones:
Carbon Green Bio Energy and AgStar Financial Services have entered into an agreement for Carbon Green to purchase the 40 Mgy Woodbury ethanol plant that was aquired by AgStar in the VeraSun bankruptcy.

The plant was part of the US Bio group that was acquired by VeraSun last March before the company imploded over hedging difficulties and the collapsing price of ethanol. AgStar will continue to lead a group of lenders in financing Carbon Green BioEnergy.

Cavitation Technologies

Based in: California
Business: Cavitation Technology is an engineering and manufacturing company, specializing in the production of the biodiesel equipment. Its BioForce 9000 technology utilizes a patent pending flow-trough NANO cavitation technology (NCT) which reduces costs and time of biodiesel production process by 7-10 times.

Model:
Licensor.

Past milestones:
Signed Miura Engineering Co., Ltd. Tokyo, Japan ("MEC") (www.miura21.co.jp) as its new agent to serve markets in Japan for CTI's Nano-Cavitation Process Systems. Miura is a leading Engineering Company specialized in Edible Oil Processing Plants in the Far East.

Announced a 3-for-1 forward stock split effective 10/29/09. CTI is a world leader in the development of technologies that represents a quantum leap over existing processing methods for a wide variety of applications and industries. Positioned to provide licensing and sales of its technology which can be applied to virtually every industrial fluid that requires complex molecular bonding, including large-scale water purification, removing impurities from agricultural based oils, biodiesel production, instant aging effects for alcoholic spirits, increased extraction of end product in crude oil refining, blending of bio-fuels as well as production of hydro-fuel (up to 15% water content yielding more efficient and cleaner burning) and much more.

Chemtex

Company description:
Chemtex is a technology oriented global engineering company with strong process and R&D competencies and is part of a Group with 70 years of excellence in manufacturing. We deliver project solutions for the renewables (biofuels and bio-based chemicals), fibers, petrochemical, energy and environmental industries internationally.
Chemtex employs approximately 1000 staff located in key centers throughout the world – Tortona and Rivalta in Italy, Wilmington, NC and Sharon Center, OH in the USA, Shanghai and Beijing in China and Mumbai, Bangalore and Baroda in India.

Chemtex is a full service project solution provider that offers state-of-the-art technologies (licensed and own), technology development (from its R&D facilities in the USA and Italy) and a complete range of project management, engineering, strategic sourcing and construction services for its clients throughout the world.

Address:
Italy Headquarters: Chemtex Italia S.r.l. Strada Ribrocca, 11 15057 Tortona (AL), Italy
USA Operations Center: Chemtex International Inc. 1979 Eastwood Road, Wilmington NC 28403

Year Founded:
1958

Chief Executive Officer and contact email:
Guido Ghisolfi – CEO, Chemtex Group
Pedro Losa – CEO Chemtex International Inc.

Annual Revenues:
USD 300m (consolidated for the Group)

Major Investors *(if a public company, please provide trading symbol and exchange)***.**

Gruppo Mossi & Ghisolfi (**"**M&G") is presently the world's largest producer of PET for packaging applications with 1.7 million ton of capacity annually. M&G is also a technological leader in the polyester market. Group sales proceeds in 2008 were almost $2.6B. The group has manufacturing assets in Brazil, Italy, Mexico and USA and supports three R&D facilities in Rivalta, Italy; Sharon Center, Ohio; and in Poços de Caldas, Brazil.

Type of Technology(ies)
Chemtex is actively involved in the bioethanol industry and has developed a game-changing second generation (2G) ligno-cellulosic ethanol technology.

Chemtex and its parent, Gruppo Mossi and Ghisolfi, have invested significant funds and have dedicated years of effort into the development of our **PROESA**TM ligno- cellulosic bioethanol technology. We have engineered and constructed a continuous pilot facility in Rivalta, Italy where we have developed a unique bio-mass pretreatment and hydrolysis process, for which 11 patents applications have been filed, for transforming cellulosic feedstocks into sugar for conversion into ethanol and/or bio- based chemicals.

Feedstocks:

PROESATM technology has the capability to use a wide variety of feedstocks. Successful testing has been completed for a number of different energy crops (Arundo Donax, Miscanthus, Fiber Sorghum and Switchgrass) and biomasses including corn stover, rice husk and straw (wheat and barley).

Fuel Type:

The **PROESA**TM platform includes an integrated solution for ethanol and power production. The sugars produced from the **PROESA** pretreatment and hydrolysis process can be also be converted to renewable diesel and a range of bio-based chemicals using the bio-technology of third parties.

Fuel Cost (if applicable - per US gallon):

Based on pilot plant results, and backed by extensive agronomic studies, the **PROESA** solution is expected to produce ethanol that is competitive to commercial grade fossil fuels based on an oil price of USD 50-70/bbl. For bio-based chemicals, the **PROESA** pretreatment technology is expected to be capable of producing fermentable sugars at approximately 50-60% of the cost of market sucrose.

Offtake partners (if applicable)
Not applicable.

Co-products (if applicable) The **PROESA** ethanol platform can also provide power, based on the burning of lignin, as a co-product for national grids.

3 Top Milestones for 2009-10

1. Successful start up of the **PROESA** pilot plant in June 2009 in Rivalta, Italy.
2. Successful continuous run - 30 days 24h/day - with straw and Arundo Donax in the spring of 2010.
3. Completion of the Basic Design package for the first 40,000 ton per annum **PROESA** Second Generation Demonstration Plant in Crescentino, Italy. Construction of the demonstration plant is targeted to begin in the fall of 2010.

3 Major Milestone Goals for 2011-13

1. Start up of the 40,000 ton per annum **PROESA**TM Demonstration Plant in Italy in Q4, 2011.
2. Conversion of a first generation (1G) ethanol plant to utilize **PROESA**TM second generation (2G) technology.
3. Start up of an integrated Biorefinery in the USA utilizing **PROESA**TM as the core technology.

Business Model:
Chemtex targets to provide full project solutions (license and EPC services) to both ethanol producers (existing or new) and bio-based chemical producers and/or their licensees.

Competitive Edge(s):

The **PROESA**TM solution is backed-up by extensive agronomic research into crop yields and crop management. Preferred biomasses (yielding up to 50 tons per hectare of usable feedstock on dry matter basis or 12 tons per hectare of ethanol) have been identified and tested and their associated logistic issues (harvesting, handling, etc.), are factored into the **PROESA**TM solution.

Key features of the technology include:
• Although yields may slightly differ, **PROESA**TM Technology has the capability to use a large variety of biomass as collected (without further processing).
• A unique pre-treatment and hydrolysis process that produces a high yield of quality and low cost sugar from cellulosic biomass for conversion to ethanol and/or bio-based chemicals.
• High efficiency in viscosity reduction enzymatic hydrolysis. • Simultaneous fermentation of C5 and C6 sugars. • Energy integration with high efficiency burning of lignin.

The cost of the carbon feed is a most important driver in the economics of any biofuels/bio-based chemicals plant. Chemtex believes that its **PROESATM** Technology is a "game-changer' as it requires no chemicals in the pre-treatment stage to generate good yields thereby resulting in a design that offers the lowest capex and opex when compared to alternative technologies. The **PROESA**TM solution is expected to produce ethanol that is competitive to commercial grade fossil fuels based on an oil price of USD 50-70/bbl. For bio-based chemicals, the **PROESA**TM pretreatment technology is expected to be capable of producing fermentable sugars at approximately 50-60% of the cost of market sucrose.

Chemtex is excited that this belief is shared by bio-tech companies such as Amyris who have entered into an agreement to integrate **PROESATM** lignocellulosic technology into their platform to produce renewable fuels and chemicals.

Distribution, Research, Marketing or Production Partnerships or Alliances.

Chemtex will be the provider of the technology and will implement projects for interested licensees of the technology.

Current alliances include Amyris with whom we have an agreement (through our parent) to integrate **PROESATM** lignocellulosic technology into their platform to produce renewable fuels and chemicals.

Chemtex has also been awarded with substantial contributions (40 million USD) by European Institutions as co-sharing / support for the Research and Development program.

We are continuing to discuss other strategic partnerships and these will be announced once they have been concluded

Stage:
A continuous pilot facility is currently in operation in our Italian R&D Pilot.
A 40,000 ton per annum **PROESATM** Demonstration Plant is under development with an anticipated start-up date of year end 2011.

Website URL:
www.chemtex.com

Clean Emission Fluids

Address:
Detroit, MI 48202

Year Founded:
2007

Annual revenues:
$0 in 2007, $20,000 in 2008, $345,000 in 2009, $3.45 million in 2010 (projected)

Type of technology(s)
High-quality ASTM Variable-ratio Biofuel "Micro-Blending" for ease of on-site, on-demand fuels with iFAST Network on tracking fuel economy and cost-reductions based on feedstock and concentration to enable mass acceptance.

Fuel Type:
Involved in storing, blending and dispensing : Biodiesel, Ethanol, Biobutanol and Diesel Exhaust Fluid (DEF)

Major investors.
Automation Alley, Troy, MI + private angel investors. Seeking $3 million additional.

Past milestones
1. Development of technology in 2008.
2. Commercial readiness in 2009 Q1.
3. Commercial Sales in 2009 Q2.

Fuure milestones:
1. Develop Production Center.
2. Scale production to 100 units in 2010, 400 in 2011.
3. Adding Biobutonal, vegetable oil (100%) fuels + other fuels/fluids.

Business model:
Manufacture – direct sales and distributorships.

Fuel cost:
$1.75 to $4.50 /gal.

Competitive edge(s):
Enabling lower Biofuel (i.e. Biodiesel) price at the pump for consumers, simplifying supply chain, to enable mass acceptance.

Distribution, research, marketing or production partnerships or alliances.
Currently pursuing and securing distribution agreements with major suppliers.

Stage:
Commercialization.

Website URL.
www.cleanemissionfluids.com and www.dieselexhaustfluid.com

ClearFuels Technology

Company description: ClearFuels is recognized as a leader in thermochemical conversion of multiple renewable cellulosic biomass feedstocks to clean, controllable syngas for the production of advanced biofuels. ClearFuels business focus is developing and operating capital efficient integrated biorefineries (IBR) that can convert multiple feedstocks and produce multiple biofuels from the same biorefinery.

ClearFuels core technology is a flexible, versatile thermochemical conversion process for producing clean controllable syngas, hydrogen, steam and power. ClearFuels' High Efficiency Hydrothermal Reformation, or HEHTR, technology integrates easily and efficiently with other advanced biofuels technologies. ClearFuels is working on technology integration with companies ranging from Amyris along the biological pathway to Rentech along the thermochemical pathway.

ClearFuels first IBR project is with Rentech's proven FT technology for versatile production of advanced drop in diesel and jet fuel from woodwaste, bagasse and mixtures of these two feedstocks. Rentech reviewed dozens of gasification technologies before making a strategic investment in ClearFuels. The two companies are completing their demonstration project, co-funded by a $22.6M DOE grant at Rentech's PDU in Colorado.

ClearFuels currently has five ClearFuels-Rentech IBR commercial projects under development through its develop, build and operate business model. Most of the integrated ClearFuels-Rentech facilities will be co-located with site partners who own sugar mills or wood processing facilities and already have biomass delivery to the site. ClearFuels-Rentech standard biorefineries will convert 1,000 tons per day of biomass to approximately 20 million gallons per year of diesel or jet fuel and naphtha, as well as 6-8 MW of exportable power. The renewable drop-in FT fuels which will be produced already meet all certification criteria for commercial and military diesel and jet fuel as shown by existing Rentech offtake contracts.

ClearFuels plans to close financing for its first commercial plant in Tennessee following successful validation at the Colorado demonstration IBR. BNP Paribas has been engaged as ClearFuels Financial Advisor for raising the senior secured debt for its commercial projects.

Rentech is independently developing additional biomass to biofuels projects outside of the United States, in which ClearFuels will participate through licensing of its technology rather than project development.

In addition to the ClearFuels-Rentech integrated biorefinery system, ClearFuels has completed technology integration with other advanced biofuels companies. ClearFuels expects its technology will be deployed through joint licensing for the development of production facilities for cellulosic ethanol, and other products from sugar based feedstocks.

ClearFuels has completed designs for HEHTR combined cycle biomass based power generation at a 30% efficiency advantage over conventional combustion boilers, which is expected to drive direct sales of HEHTR modules.

The gateway to these multiple pathways to commercialization is the successful demonstration facility, which will lead to limited performance guarantees from ClearFuels EPC and HEHTR fabrication partners to support financing of ClearFuels commercial projects.

Address: Hawaii Research Center
99-193 Aiea Heights Drive, Suite 308
Aiea, HI, 96701

Year Founded: 1998

Chief Executive Officer and contact email:

Eric Darmstaedter
edarmstaedter@clearfuels.com

Annual Revenues: Pre-revenue except for grant funding

Major Investors *(if a public company, please provide trading symbol and exchange).*

Hawaiian Electric Industries, Alexander & Baldwin, Kolohala Ventures, Garage Ventures, Pacificap Ventures, Ulupono Initiative, Rentech Inc.

Type of Technology(ies) : ClearFuels core technology is High Efficiency Hydrothermal Reforming (HEHTR). This unique steam reformation process combines indirect firing, pre-mixing of steam and biomass in an entrained flow design, independent control of residence time in the reformer and flexible firing that can use syngas, natural gas, biogas or tailgas from other processes. This enables high efficiency thermochemical conversion of multiple biomass feedstocks to a versatile and flexible clean controllable low tar syngas, plus process steam for heat or power. HEHTR operations can be varied to produce a hydrogen to carbon monoxide ratio from 1 to 1 up to 3 to 1 with the same design. The HEHTR's flexibility allows for multiple configurations that can match needs for syngas, steam, power and hydrogen from a single HEHTR. This provides multiple technology integration opportunities for ClearFuels to produce renewable power, hydrogen, cellulosic ethanol and drop in diesel and jet fuel from biomass. The basis for ClearFuels HEHTR technology was developed by PTI, tested at various pilot plants in conjunction with Hawaii Natural Energy Institute and Idaho National labs over 10 years, and continuously improved by ClearFuels and its partners over the past 5 years.

Feedstocks: ClearFuels focuses on multiple clean biomass feedstocks. ClearFuels has 10 years of successful pilot plant operating experience on various woodwastes, sawdust, bark, sugarcane bagasse, rice hulls and straw, corn stover and other clean biomass. Unlike biochemical processes, the primary driver is carbon in any form, with no difference in lignin, cellulose, or hemicellulose. The HEHTR operating temperatures are also below ash softening temperatures, which avoids slagging/fouling concerns.

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc)

ClearFuels-Rentech integrated process will produce drop in jet fuel, naphtha and diesel. ClearFuels integration with another advanced biofuel company will produce cellulosic ethanol. ClearFuels also produces hydrogen and renewable power.

Fuel Cost (if applicable - per US gallon): *(If you do not manufacture or have long-term stable feedstock pricing, please use the latest December futures contract pricing for traded feedstocks, or $55/ton for untraded biomass – or provide notes on your own feedstock pricing assumptions).*

ClearFuels commercial projects are all co-located at either existing lumbermills or sugarmills. Typical costs for byproducts from its site partners are in the $50 per dry ton of feedstock range. ClearFuels co-locates with its site/biomass partners and can also provide steam and power back to its partners through energy conversion contracts. This enables more stable long term feedstock pricing.

Offtake partners (if applicable)

Offtake contracts for ClearFuels projects in the Southeast US are in progress with well established Fortune 100 transportation companies. ClearFuels leverages off of Rentech relationships with commercial airlines for jet fuel offtake contracts. Potential offtake contracts in Hawaii are with Hawaiian Electric for diesel and Department of Defense for jet fuel.

Co-products (if applicable): ClearFuels-Rentech typical integrated IBR commercial facility will produce approximately 20 million gallons per year of renewable jet/naphtha or diesel/naphtha plus 6-8 MW of renewable power for export. ClearFuels IBR structure is driven by long term feedstock contracts with its site partners, EPC contract and offtake contracts for renewable power and biofuels. Flexibility allows for hydrogen, steam, heat and other syngas product outputs if needed.

3 Top Milestones for 2009-10

* Strategic investment by Rentech for 25% ownership of ClearFuels including completion of technology integration, cross licensing of technologies and integrated demonstration

and commercial development plans, in June 2009

* Winning DOE IBR grant for $22.6M to demonstrate the integration of ClearFuels and Rentech technologies for clean biomass to renewable jet and diesel, in December 2009

* Completion of bridge finance with Ulupono Initiative and Rentech in August of 2010 and completion of Budget Period One of DOE grant project to enable groundbreaking for construction of the IBR facility to start Budget Period Two, in October 2010

3 Major Milestone Goals for 2011‑13

2011

* Completion of technology integration with two additional advanced biofuels companies and announcement of joint projects development in first quarter of 2011

* Completion of long term offtake negotiations for Hawaii commercial project with Hawaiian Electric by mid 2011

* Completion of commercial design for 1000 tpd IBR facility in TN by end of 2011.

2012

* Successful completion of the DOE IBR demonstration project by first quarter of 2012 to enable performance guarantees for commercial project finance.

* First sale of HEHTR modules for reformer combined cycle biomass to power facilities

* Completion of offtake contract for TN and AL projects with Fortune 100 transportation sector partner

2013

* Complete permitting for close of financing on Hawaii IBR project.

* Complete project development phase for first international project co-located with sugarmill partner

* Complete construction of first commercial integrated ClearFuels-Rentech IBR in late 2013.

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

ClearFuels has a multi-pronged pathway for commercialization of its HEHTR technology, which will stem from successful completion of it's DOE IBR demonstration project. The demonstration project will prove the commercial readiness of ClearFuels HEHTR technology for conversion of multiple clean biomass feedstocks to controllable syngas for power and hydrogen production, and also prove the integration of ClearFuels technology with Rentech FT technology for integrated production of renewable jet fuel and diesel.

ClearFuels has completed preliminary designs with URS for steam reformation, combined cycle biomass power plants. ClearFuels will provide HEHTR modules for sale to this market.

ClearFuels will license its HEHTR technology to other advanced biofuels companies for integration into IBR facilities with the production of steam, heat, power, hydrogen and/or syngas.

ClearFuels is developing five integrated ClearFuels- Rentech IBR projects in the US under its build own operate model.

ClearFuels will provide its HEHTR technology to Rentech under license for projects that Rentech is developing other than sugarcane bagasse worldwide or woodwaste projects within the US.

This multi-pronged approach allows ClearFuels to enter the commercial markets with its HEHTR technology at low capital intensity for syngas and power projects, while in parallel developing its build own operate IBR facilities with Rentech and other strong offtake and site partners.

Competitive Edge(s): ClearFuels is recognized as a leader in thermochemical conversion of renewable cellulosic biomass feedstocks to clean, controllable syngas for the production of advanced biofuels. The HEHTR design specifically for clean biomass feedstocks results in significant key advantages. The use of steam instead of air or oxygen eliminates the need for an oxygen plant and reduces the footprint of the facility by eliminating nitrogen dilution from air, which reduces capex and opex.

The indirect firing process and entrained flow design results in a cleaner syngas with low tars, which reduces gas cleanup expense. The design allows for operational flexibility to control the hydrogen to carbon monoxide ratio from 1:1 to 3:1 for efficient integration with downstream processes at lower cost. The versatility of firing tailgas, syngas, biogas or natural gas from technology integration results in higher yields of biomass to biofuels for better energy efficiency and lower carbon footprint.

These advantages have been validated through a strategic partnership with Rentech Inc.

Rentech's investment decision was made following an evaluation of dozens of gasifiers, which determined that the ClearFuels-Rentech integrated platform would yield >30% more biofuels per ton of biomass at lower capital and operating costs per gallon than integration with any other gasifier. ClearFuels also produced clean, low-tar syngas with optimal characteristics for Rentech's FT catalyst. This integration will enable ClearFuels to be a first mover in low-cost production of renewable drop in jet fuel and diesel from clean biomass.

Distribution, Research, Marketing or Production Partnerships or Alliances.

URS is our EPC partner for our demonstration facility and engineering partner for our first commercial facilities

Hydro-Chem, a division of Linde Process Group is our fabrication/manufacturing partner for our HEHTR modules. Hydro-Chem is manufacturing the HEHTR for our demonstration project and will manufacture the 250 tpd modules for our commercial facilities.

Hawaiian Electric Industries is a strategic investor and an alliance partner for offtake of renewable diesel

Rentech Inc is a strategic investor, technology integration partner and commercial development partner for biomass to renewable diesel and jet fuel IBRs

Hawaii Natural Energy Institute is a long term research partner for development of syngas and hydrogen from biomass.

Stage (Bench, pilot, demonstration, commercial):

ClearFuels completed testing with PTI, Hawaii Natural Energy Institute and Idaho National labs between 2002 and 2007 at the pilot scale level. ClearFuels further developed the technology for commercial application from 2006 to 2009. ClearFuels HEHTR technology is currently being integrated with Rentech's $85 million Product Demonstration Unit (PDU) in Colorado at the pre-commercial demonstration stage. This demonstration will validate the integration of the ClearFuels HEHTR with the Rentech FT process for the conversion of multiple feedstocks (wood waste, bagasse and mixed biomass) to renewable diesel and jet fuel. Co-location and integration of the ClearFuels HEHTR with the PDU provides a lower-cost and lower-risk pathway to commercialization than a Greenfield demonstration facility. Rentech's experience operating the PDU for more than 1,000 hours since 2008 and already producing ASTM certified fuels from syngas derived from natural gas will help facilitate a rapid and successful commercial validation of the combined technologies. This demonstration which will produce renewable ASTM certified fuels from syngas derived from biomass will lead directly to commercial facilities.

Website URL: www.clearfuels.com

Comet Biorefining

Based in: – 737 Guildwood Boulevard, London, Ontario N6H 5G2
Year founded – 2009
Annual revenues 2009 (projected) – under $1 MM

Type of technology
Pretreatment; Comet Biorefining has developed a transformative technology to produce cellulosic sugar from biomass for the production of biofuels and bioproducts.

Type of fuel produced
Comet's cellulosic sugar can be used to produce any biologically derived fuel, including ethanol, butanol, synthetic hydrocarbons, algal fuels.

Major investors
Internally funded

Past milestones
Proof of concept at lab/pilot scale
Patents filed
Co-location site for demonstration facility identified

Future milestones
Financing
Construct/optimize demonstration facility and design commercial system
Establish downstream partnerships and licensees

Business model
License cellulosic sugar production technology; royalty-based payments

Competitive advantage
Low cost sugar; as low as 7 cents/lb

Stage
Pilot stage

Url

www.cometborefining.com

Continental Bio-Refineries

Address:

Vancouver, BC

Year Founded:

2009

Annual revenues:

pre-revenue

Type of technology(s)

Thermochemical dehydration

Fuel type:

Polymeric Carbon Bio-Fuel (Synthetic Coal). Energy Density from 18 to 30 GigaJoules / tonne

Major investors.

Alexis Fosse Mackintosh, Jerome De Luca, Chris Roberts

Past milestones

1. Complete the construction of the 20 litre (12kg) tandem bio-refinery for the production of Solid PolyCarbon Bio-Fuels from non-recyclable paper waste. Completed September 5, 2009. The testing of product produced from a variety of feedstocks is ongoing.

2. Confirmation that International bio-fuel standards exist, Lab tests confirm compliance and verifying trials with various waste streams continue

3. Complete engineering and design studies for a 5 tonne bio-refinery to be built in 2010 and to complete construction of a laboratory scale engineering model.

Future milestones

1. Design and build a tandem 5 tonne Solid PolyCarbon Bio-Fuels bio-refinery to test the commercial feasibility of the intellectual property in the two patents licensed from EveGenetics Canada. The design and construction is underway and expected completion Spring 2010.

2. Design and build a 100 tonne a day to Solid PolyCarbon Bio-Fuels plant to convert cellulosic waste from an Ethanol Plant to synthetic coal to provide fuel to Ethanol Plant. Revenues from the demonstration plant will be used to commercialize the technology and support further research. Expected completion Q4 2010.

3. Develop closed loop waste to energy model for commercial settings eg. Greenhouse operations to use waste to produce synthetic coal to fuel boilers and to recapture CO2 increase vegetable yields.

Business model – Design, build and operate as joint ventures and limited partnerships.

Fuel cost:

Cost to produce fuel will be approximately $40 CDN / Metric Tonne

Competitive edge(s):

Waste diversion from landfills resulting in better methane gas mitigation, operators using synthetic coal will receive carbon credits since synthetic coal is newly fixed as a closed sequestered carbon.

Stage:

10 Tonne/Day commercial-scale demonstration bio-refinery

Website URL.

www.continentalbiorefineries.com

Continental Technologies

Address:

Headquarters: 4635 Nautilus Court South, Boulder, CO 80301

Year Founded

Continental Technologies was founded in late 2007 in Ponca City, Oklahoma to service the pilot plant needs of the energy and chemical industries with a unique value proposition – the entire staff has come from large company R&D departments so that the design and fabrication focus is from the end-user's perspective. In addition, pilot plants are not a filler; they *are* what the company does. Continental Technologies is the only pilot plant fabricator who offers an option to operate the pilot plants at its facilities. Finally, Continental Technologies sister company, Eltron Research and Development, is a 27-year old, 50-employee company that can be utilized to augment the clients' development capabilities.

Annual revenues 2009 (projected), 2008, 2007

Confidential.

Type of technology:

Continental Technologies specializes in pilot plant fabrication, focusing on fuels (including synthetic and biofuels), catalysts, chemicals and polymers process technology development and scale-up. The company has experience with equipment for virtually every fuels relevant process – gasification, pyrolysis, hydrotreating, fermentation, Fischer Tropsch synthesis, transesterification – as well as catalyst development, hydrogen production and chemicals development.

The company's suite of services includes fabrication, design, engineering, installation, training, documentation and operation. Continental Technologies has had several customers tell them that their ability and willingness to operate pilot plants for clients and the capability to train their operators are significant advantages.

Past milestones

- Continental Technologies recently completed their first major job, with the leading company in the U.S. for biomass and coal conversion to liquid fuels. Continental Technologies designed and fabricated six reactor systems and provided startup services and training.

- Continental Technologies moved into their new 34,000 square foot fabrication facility, located in Ponca City, Oklahoma. The facility is near major highways and rail routes and features high bay workspace, five-ton and ten-ton overhead cranes and areas designed for unit testing and operation.

- Continental Technologies completed three more jobs after moving into the new fabrication facility. The company is well-positioned to assist clients in the rapidly-expanding biofuels area to scale up their technologies.

Future milestones

- To participate meaningfully in the alternative energy business by helping companies scale-up their technologies.

- To triple Continental Technologies' workload.

- To operate a plant in-place that we built for a client.

Business model (e.g. licensing, owner/operator)

Engineering Design/Fabrication/Operation Services provider

Fuel cost (per gallons)

NA

Competitive edge:

- Continental Technologies' core staff previously worked in the R&D

departments of big oil companies, designing, building and operating pilot-scale process equipment for 20+ years. The combination of this technical expertise with hands-on operation experience enables Continental Technologies to approach each project from the user's perspective – building each unit as though they will be running it themselves. The result is a unit built by operators, for operators that is easy to operate and maintain while providing the data and product essential to optimizing processes. Safety is a foremost design principle and Continental Technologies' experience and training allows them to contribute to formal safety review and compliance with industry standards and regulations.

- Customers can save an estimated 20% by choosing to have Continental Technologies' experienced staff operate their pilot plant where it is fabricated in Continental Technologies' fabrication facility. This is possible because the equipment won't need to be skid-mounted, shipped or installed, cutting costs and speeding time to operation. Continental Technologies will gladly host a customer's team of operators as well, providing as much assistance and training as is requested. No other pilot plant designer or fabricator offers this capability.

- One unique advantage that Continental Technologies has versus its competitors is a close working relationship with Eltron Research & Development, an organization with over 25 years of experience in catalyst design, synthesis, evaluation & scale-up, materials research & synthesis, design & engineering, analytical services, prototype development, and technology feasibility studies. Engaging Eltron can help speed time to market and reduce risks associated with introducing new technology. In essence, Eltron's Ph.D. scientists and engineers are an "instant R&D" team that's ready to complement your in-house staff and help you adjust to industry trends.

Distribution, research, marketing or production partnerships or alliances

NA

Stage (e.g. seed, pilot, demo, commercial)

Continental Technologies is a commercial entity.

Website URL

www.contechfab.com

Diversified Energy

Based in: 2020 W. Guadalupe Road, Suite 5 Gilbert, AZ 85295

Founded: 2005

2009 annual revenues (projected) = $500k
2008 annual revenues = $500k

Business:
Diversified Energy Corporation is a renewable and alternative energy technology development and commercialization company. The strategy of the company is to maintain a diverse portfolio of technologies in the gasification and biofuels markets. As such, the company is developing (1) an innovative molten-slag based gasifier [OmniGas™] that can gasify a wide range of feedstock and produce an ultra-clean syngas, (2) a biorefinery technology to covert non-food based oils to petroleum-equivalent transportation fuels using little net hydrogen [Centia™], (3) a glycerol burner for the production of heat and/or power using raw crude glycerol from transesterification-based biodiesel production, and (4) a low cost algal biomass production system [Simgae™]. The company has been the recipient of numerous government grants and private investment to develop and ultimately commercialize these technologies.

Technology:
From OmniGas™ – syngas and/or various outputs from the further processing of the syngas (e.g., natural gas, FT diesel, methanol, ethanol, chemicals, and electricity) From Centia™ – biojet fuel, renewable diesel, and biogasoline all similar to petroleum-derived fuels
From glycerol burner – heat and/or power
From Simgae™ – algal biomass, lipids, nutraceuticals, and animal/fish feed

Investors
W. David Thompson (founder) and private individuals. Company is privately held and funded, no venture capital or institutional funding.

Past milestones:
a) Capture of multiple Small Business Innovative Research (SBIR) contracts from the DOE and DoD to develop the OmniGas™ molten-slag gasifier at a scale of 1 ton/day, as well as a R&D grant award from the California Energy Commission.
b) Successful production of sample batches of renewable diesel from Centia™ biorefinery process under a grant from the state of North Carolina.
c) Successful fabrication and operation of a 90k Btu/hr crude glycerol burner prototype, including testing for emissions and use of glycerol from operational biodiesel plants.

Future milestones

a) Successful demonstration of OmniGas™ reactor at 1 ton/day, construction start for full- scale, commercial equivalent pilot-plant facility.
b) Design, integration and demonstration of a 20 – 50 gallon/day Centia™ system taking multiple inputs (algal oils, jatropha oils, and animal fats) and producing biogasoline and biojet fuel with little net hydrogen consumption.
c) Scale-up of crude glycerol burner to 2 MW class, first commercial orders received.

Business model
Diversified Energy has a business model that is capable of reacting to the market environment and the situation at hand. The company requires additional capitalization to complete the development and commercialization of its technologies. Dependent upon the source of that funding, the company is open to sublicensing its technologies, forming JVs, spinning out the IP into new entities, selling its IP, building and selling plants, and/or building and operating plants.

Fuel cost:
OmniGas™ syngas estimate is $4.00 - $6.00/MMBtu. Centia™ estimate is <$0.40/gallon plus the cost of the incoming feedstock.

Competitive edge:
Diversified Energy's competitive advantage is in its suite of innovative technologies, all of which have a common set of powerful, value-added attributes including: 1) technologies that can accept multiple incoming feedstocks, 2) technologies that can produce fuels that look akin to fossil-fuel based products, and 3) technologies that can economically scale to various sizes and thus bring distributed applications in close proximity to feedstock sources and energy distribution nodes.

Stage:
Pilot

URL:
www.diversified-energy.com

Drystills

COMPANY INFORMATION

Based in:
3549 Mavis Road Mississauga L5C 1T7 Ontario Canada
Year founded: 2006

Annual revenues
2007: $0
2008: $0
2009: $0

Type of technologies

Drystill is a Canadian developer and supplier of chemical separation technology. The company has developed a ground-breaking process - perhaps the only economical one at present - for refining cellulosic and corn ethanol from weak beers in the 3-8 wt% ethanol range. This is a strategic breakthrough for the Biofuel industry that will lead to a paradigm shift in the way ethanol is produced in the future.

At the heart of Drystill's technology is a proprietary, novel, apparatus called a Stripper/Absorption Module ("SAM") - the first of its kind in the World. This key technology enables Drystill to apply advanced, processing techniques, such as: simultaneous fermentation and extraction ("SFE"); low temperature, vacuum evaporation; and multiple-effect distillation ("MED") of beers.

The benefits of Drystill's technology to the Biofuel industry are significant, reducing both operating and capital costs. For example:

♣ SFE allows practical, continuous fermentation, using weak beers. Production is therefore faster (residence time is reduced by 85%), yeast is potentially less stressed and less prone to infection, and more productive. At the same time, consumption of yeast is lowered.

♣ The beer column is replaced by a MED device that does not suffer from fouling at high temperatures.

♣ Consumption of energy during refining is reduced be 50% or more, e.g. to below 10,000 BTU/gal for an 8 wt% ethanol beer. Hypothetically, if all the plants in North America were using Drystill's technology, more than $2 billion p.a. in energy alone would be saved, or recovered by selling the surplus.

♣ Capital expenditure is reduced by using smaller fermentation tanks (only 10% of size), cooling towers and steam plants, while beer columns and molecular sieves are replaced by less expensive and more efficient alternative equipment.

In addition to the economic and technical benefits above, the environmental benefits are also very positive. Not only is energy consumption reduced substantially, but also the carbon footprint and water consumption. CO_2 emissions are also reduced.

Simultaneous fermentation & extraction
Low temperature, vacuum evaporation
Multiple-effect distillation
Absorption/desorption
Pervaporation/vapour permeation
Solids handling

Type of fuel produced
Ethanol, butanol, other

Past milestones
Development of SFE technology
Provisional patenting of unique Stripper/Absorption Module ("SAM") – the key enabler of SFE and MED (see #5)
Establishment of relationships with seven large ethanol plant designers and owners

Future milestones
Attract a major investor
Construct a pilot/demonstration plant
Conclude a contract to install technology in a new plant, or retrofit an existing plant.

Business model
Licensing, component supply

Competitive edges(s)
Continuous ethanol extraction and fermentation
Faster processing with low residence times
Healthier & less stressful environment for yeast, leading to increased yield
Reduced refining energy consumption by 50% or more
Reduced capital expenditure
Smaller carbon footprint

Stage
Pilot/demo

Website URL
www.drystill.ca

DSM

Company description:
Royal DSM N.V. creates solutions that nourish, protect and improve performance. Its end markets include human and animal nutrition and health, personal care, pharmaceuticals, automotive, coatings and paint, electrical and electronics, life protection and housing. DSM manages its business with a focus on the triple bottom line of economic performance, environmental quality and social responsibility, which it pursues simultaneously and in parallel. DSM has annual net sales of about €8 billion and employs some 22,700 people worldwide. The company is headquartered in the Netherlands, with locations on five continents. DSM is listed on Euronext Amsterdam.

Address:
Visiting:
Het Overloon 1
6411 TE Heerlen
THE NETHERLANDS

Mail:
P.O. Box 6500
6401 JH Heerlen
THE NETHERLANDS

Year Founded:
1902

Chief Executive Officer and contact email:
CEO Royal DSM: Feike Sijbesma
Vice president Biotechnology: Volkert Claassen

Annual Revenues:
2008: 9,297 million EUR (approx. 13,600 million USD)
2009: 7,866 million EUR (approx. 9,850 million USD)
2010 Jan Jun: 4,636 million EUR (approx.5,600 million USD)
Based on current positive business environment, 2010 is expected to be a strong year for DSM

Major Investors *(if a public company, please provide trading symbol and exchange).*
DSM is a publicly listed company at the NYSE Euronext Stock Exchange in Amsterdam, The Netherlands (ticker symbol DSM KON).

Type of Technology(ies)

Feedstocks:

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc)
Enzymes trace element preparations and process optimization service for biogas (DSM Biogas Services)
Enzymes, advanced ethanol yeast and advanced processing technologies for cellulosic ethanol via a localized, on-site production business model (DSM White Biotechnology - Bio-Conversion Solutions)

Fuel Cost (if applicable - per US gallon): *(If you do not manufacture or have long-term stable feedstock pricing, please use the latest December futures contract pricing for traded feedstocks, or $55/ton for untraded biomass – or provide notes on your own feedstock pricing assumptions).*
Not applicable.

Offtake partners (if applicable)

Co-products (if applicable)

3 Top Milestones for 2009-10

- 2009: as a partner in the KACELLE consortium led by DONG Energy, DSM received a 1.1 M EUR grant from the European Commission (Framework Program 7) for the development of advanced ethanol yeast. This yeast has the potential to improve the economic viability of a wheat straw based biorefinery.

  Reference:
  http://www.inbicon.com/Projects/KACELLE

- 2009: DSM has acquired Biopract, which has developed the Methaplus™ enzyme series for the improvement of agricultural and industrial biogas production. Biopract is integrated into DSM's biogas service concept for optimizing the biotechnology of biogas plants. Based on a thorough analysis of the production process, DSM offers biogas plants tailor-made advice and a product mix to improve the performance of the plant.

  Reference:
  http://www.dsm.com/en_US/html/media/press_releases/28_09_DSM_acquires_Biopract_to_enter_fast_growing_biogas_market.htm

- 2010: DSM announces two breakthrough innovations in technology for second generation biofuels. The first innovation is the identification of enzymes that are able to break down biomass into its constituent sugars much more efficiently and at a higher temperature compared to products and prototype formulations available in the market today. These unique properties enable a lower enzyme dosage, better contamination control during fermentation, increased feedstock loading, reduced energy consumption and shorter processing time. The second innovation is the development of an advanced yeast strain that is capable of converting all the major sugar components found in biomass (both six carbon and five carbon sugars) to ethanol. Using this advanced yeast, the overall ethanol yield can be improved by up to 100% as compared to the yield of standard yeasts used today. The combination of these two innovations will result in greatly improved process economics and productivity for second generation biofuel producers coupled with the sustainability benefits derived from the use of second generation feedstocks. .

Reference:
http://www.dsm.com/en_US/html/media/press_releases/29_10_dsm_announces_breakthrough_in_technology_for_second_generation_biofuels.htm

3 Major Milestone Goals for 2011-13

Making cellulosic ethanol a commercial reality:

- Finalize development of a cost effective cellulases cocktail for the industrial scale hydrolysis of pretreated lignocellulosic biomass.
- Finalize development and start commercialization of advanced ethanol yeast for the industrial scale production of cellulosic ethanol from C5 and C6 sugars obtained from lignocellulosic biomass.
- Integrating and optimizing these technologies into an advanced biorefinery using agricultural residue streams such as wheat straw and corn stover for the production of cellulosic ethanol.

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

- Co-owner and operator of plants for the commercial demonstration of on-site production of lignocellulosic enzymes and advanced ethanol yeast
- Licensing out of core technologies (e.g. advanced yeast metabolic pathways)
- Licensing out of technology packages for the conversion of lignocellulosic biomass into ethanol including on-site production of lignocellulosic enzymes and advanced ethanol yeast

Competitive Edge(s):

DSM, the global Life Sciences and Materials Sciences company:

… has over 100 years of experience in enzymes and yeast development and production;

… is currently one of the top industrial biotechnology companies with over 2 billion USD of sales coming from industrial biotechnology based products;

… has all disciplines which are required to cost effectively produce cellulosic ethanol via the biochemical pathway in house;

… has an advanced research & development infrastructure for improvement of microorganisms for the production of enzymes, cellulosic ethanol and biobased chemicals;
… has developed an alternative cellulases enzymes system capable of further lowering the contribution of enzymes to biofuels' total cost, going beyond the current state of the art;
… has an extensive manufacturing infrastructure for pilot and commercial production of enzymes and yeast;
… targets on-site production of enzymes and advanced ethanol yeast following the principle that only through integration and joint optimization with a biorefinery partner cost effective production of cellulosic ethanol can be achieved;
… is an important supplier of ingredients to the food and feed markets and is an innovative player in the field of performance materials, and is hence well positioned to provide innovative solutions for the valorization of biorefinery side streams, including proteins and lignin;
… is altogether a truly differentiated provider of a full package of biobased solutions for the cellulosic ethanol market.

Distribution, Research, Marketing or Production Partnerships or Alliances.
DSM has set up multiple joint technology development partnerships in the field of cellulosic ethanol, similar to its current partnership with Roquette (France) on succinic acid. These partnerships may grow out into commercial demonstration plant partnerships and/or licensing-out partnerships.

Stage (Bench, pilot, demonstration, commercial)
DSM produces enzymes and yeast for applications outside biofuels on a commercial basis. DSM runs pilot production of cost effective enzymes and advanced ethanol yeast for biofuel applications.

Website URL
www.dsm.com

Company name:

Dyadic International, Inc.

Company description:

Dyadic International, Inc. is a global biotechnology company that uses its patented and proprietary technologies to conduct research, development and commercial activities for the discovery, development, manufacture and sale of products and solutions for the bioenergy, industrial enzyme and biopharmaceutical industries.

Address:

140 Intracoastal Pointe Drive
Suite 404
Jupiter, Florida 33477

Year Founded:

1979

Chief Executive Officer and contact email:

Mark A. Emalfarb, President and CEO
memalfarb@dyadic.com

Annual Revenues:

$21.4 million (as of 12/31/09)

Major Investors *(if a public company, please provide trading symbol and exchange).*

Pink Sheets: DYAI

Type of Technology(ies)

Patented and proprietary C1 platform technology based on a unique fungal microorganism which is programmable and scalable in producing enzymes and proteins in large quantities

Feedstocks:

Dyadic's C1 platform technology is effective in producing enzymes from a broad variety of feedstocks

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc)

Dyadic's C1 platform technology can be used to produce many types of biofuels including, but not limited to, cellulosic ethanol, biobutanol and biodiesel.

Fuel Cost (if applicable - per US gallon):

N/A

Offtake partners

- Abengoa Bioenergy
- Codexis Inc.

Co-products (if applicable)

Industrial Enzymes

3 Top Milestones for 2009 - 10

1. Entered into non-exclusive license agreement with Abengoa Bioenergy
2. Reported record revenues and profits for fiscal year 2009
3. Signed term sheet for potential exclusive outlicense of C1 technology for biopharmaceutical applications to EnGen Bio, Inc.

3 Major Milestone Goals for 2011 - 13

1. Consummate additional licensing and other strategic collaborations to monetize Dyadic's technologies
2. Increase sales of industrial enzymes
3. Consummate additional research and development collaborations

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

- Technology licensor
- Industrial enzyme sales

Competitive Edge(s):

- Patented and proprietary C1 technology
- C1 platform technology is programmable (genome has been sequenced and annotated)

- C1 technology can produce enzymes and proteins on commercial scale (up to 150,000 liter fermentors)
- Dyadic provides partners with ability to license the C1 platform technology for in-house/on-site manufacturing of customized enzymes and proteins

Distribution, Research, Marketing or Production Partnerships or Alliances.

- Non-Exclusive License Agreement with Codexis Inc. for use of C1 technology for biofuels, chemicals and pharmaceutical intermediate production
- Non-Exclusive License Agreement with Abengoa Bioenergy New Technologies, Inc. for use of C1 technology for biofuels, chemicals and/or power production
- Non-binding term sheet with EnGen Bio, Inc. for potential outlicense of C1 technology for biopharmaceutical applications
- Multiple research partnerships

Stage:

Dyadic has been producing enzymes in up to 150,000 liter fermentors for over a decade

Demonstration and soon-to-be commercial stage through Dyadic's licensees and partners

Website URL

www.dyadic.com

Dynamic Fuels

Based in: Louisiana

Business:
Dynamic Fuels is a 50/50 venture between Syntroleum and Tyson Foods. Develops process for converting low value and waste fatty acid/glyceride streams (from spent vegetable oils used in food processing to palm oil fatty acid distillate) into high quality hydrocarbon fuels (diesel, jet fuel, naphtha, and LPG).

Model:
50/50 venture between Syntroleum and Tyson Foods. Dynamic Fuels' business model is "own and operate" bio-refineries based on Syntroleum's Bio-Synfining process.

Past milestones:
Dynamic Fuels has spent all of the past year staffing up and building a 75 million gal/yr plant in Geismar, LA (near Baton Rouge). This will be the first "second generation" biofuels plant in the U.S.--converting non-food biofeeds into drop-in hydrocarbon fuels.

Future milestones:
Commercial production is scheduled to begin during first quarter of 2010.

URL:
www.dynamicfuelsllc.com

EdeniQ

Based in: California

Business:

EdeniQ supplies technology to the global biofuels industry that dramatically increases yields from today's corn and sugarcane ethanol plants and ultimately enables the capital-efficient migration of these so-called "legacy producers" to full, non-food, cellulosic production. EdeniQ employs proprietary biological and mechanical processes that include low glycerol yeasts, SSF, proprietary enzymes, and proprietary comminution and desiccation devices. EdeniQ is primarily focused on cost-effectively converting cellulosic biomass into affordable C5 and C6 sugars that can then be processed into a wide variety of biofuels and biochemicals. The company is pursuing technologies to convert C5 and C6 sugars into heavier fuels including jet fuel.

Model: Licensor.

Past milestones:

1. Commercialized yield enhancement technologies in the U.S, and Brazil 2. Advanced mechanical pre-treatment technology 3. Advanced SSF/enzyme technology

Future milestones:

1. Dramatically grow market penetration of our corn and sugarcane yield enhancement products: Corn3 and Eden3 2. Build the demo for our CCM (Corn to -Cellulose Migration) solution. 3. Have SSF and enzymatic technologies ready for commercialization.

Metrics: Targeting $1.50 fuel cost without subsidies. Corn3 increases ethanol yields from corn by over 10%. Eden3 increases ethanol yields from sugarcane by over 4%.

EdeniQ quotable quotes: "Capital efficient, low-cost, and fast-to-market. The cost of migrating "legacy" producers to cellulosic production is about half the cost of building green field cellulosic plants and can be done in about half the time. In a capital constrained global economy we are committed to leveraging the billions of dollars already deployed in "First generation" production.

ElectroSep

Based in: PO Box 985, Corvallis, OREGON 97339
Year Founded: 1997

Annual Revenues:
Small private engineering company presently operating in research and development mode. Revenues for 2010 are projected at $500,000

Technology:

A patented electrolytic membrane separation technology combined with a novel mild pretreatment process that provides extraction and recovery of chemicals for production of cellulosic ethanol and butanol from wood and norwood materials. The value added coproducts exhibited in several pilot tests and the high sugar yields data obtained in preliminary lab tests performed by Electrosep and Oregon State University professor M. H. Penner showed that the Electrosep process may possibly produce nonwood cellulosic ethanol at commercially viable costs, i.e. approximately $1.15 per gallon of ethanol. Please refer to ATTACHED brief description of Electrosep's Mild Pretreatment Breakthrough on Cellulosic Ethanol production.

Fuel type:
The new Electrosep process can be used for production of cellulosic ethanol and butanol from wood and nonwood raw materials.

Major investors:

The company is privately owned. The research and pilot development work was mainly funded with private investment. Some pilot projects were funded by a major energy corporation in Canada and a large company in Switzerland. The original electrolytic chemical extraction technology was pilot tested at a pulp and paper mill in the state of Washington. The US Dept. of Energy (Golden Office) funded part of the $2.5 million cost of the pilot project.

Past milestones:

a. Performed pilot tests on electrolytic caustic soda recovery, generation of hydrogen, and extraction of lignin from black liquors generated at several softwood pulp and paper mills in Canada. This pilot operation was part of an ongoing project being performed by Electrosep and a major multi-billion dollar energy corporation in Canada. These tests provided energy consumption data for softwood liquor treatment on a continuous 24-hour basis. The data showed that caustic soda and coproducts may possibly be produced at commercially viable costs.

b. Performed bench scale testing special mild pretreatment of softwood and corn stalk materials in reactor followed by enzymatic saccharification for glucose production using conventional types of enzymes The enzymatic hydrolysis work was performed by Oregon State University professor M. H. Penner, PhD.

c. Formed a joint working relationship with OSU professor M. H. Penner to jointly perform bench scale tests on sugar production using Electrosep pretreated wood and nonwood cellulosic materials. Electrosep and OSU have applied and will continue to apply for grants in pursuit of funds for research during year 2010 and beyond.

Future milestones:

a. Test the electrolytic process and determine projected years of durability for various types of electrodes and membranes, i.e. DuPont Nafion® perfluorinated membrane and other possible suppliers.

b. Bench tests to determine glucose and xylose yields using maximum glucan and xylan concentrations in hydrolysates produced from EL pretreated cellulosic materials. Tests should include various types of enzymes and genetically engineered microbes to determine optimum yields at minimum cost for cellulosic ethanol and butanol production using EL pretreated materials.

c. Pilot scale testing the cellulosic ethanol production process from nonwood and wood raw materials

Business model:
Engineering design and licensing the technology

Fuel cost:

Preliminary estimates of net fuel cost are approximately $0.45 per gallon of ethanol for norwood and $0.96 oer gallon of ethanol for wood. The overall production cost is estimated at $1.15 per gallon of ethanol for nonwood cellulosic ethanol and approximately $1.85 per gallon of ethanol for wood.

Competitive edge(s): (e.g. Distribution, economies of scale, low-cost, yield, etc).
Yields and coproducts provide low cost cellulosic biofuels

Alliances and Partnerships:
Research or production partnerships and alliances are acceptable

Development stage

The electrolytic chemical recovery process is presently at pilot stage. The hydrolysis process may be pilot tested soon after bench scale optimization tests are completed.

Website URL
www.electrosepinc.com

Elevance Renewable Sciences

Company description:
Based in Bolingbrook, Ill., Elevance Renewable Sciences creates high value specialty chemicals from natural oils using a Nobel Prize winning technology. The company creates ingredients for use in personal care products, detergents, fuels and lubricants, among other applications. In June 2010, Elevance formed a Joint Venture with Wilmar International to build the world's largest biorefinery. The 360,000 metric ton plant will be operational in the 2nd half of 2011 with its first 180,000 metric tons (approx. 400 MM lb). To learn more about the company, visit www.elevance.com.

Address:
175 E. Crossroads Parkway
Suite F
Bolingbrook, IL 60440

Year Founded: 2007

Chief Executive Officer and contact email:
K'Lynne Johnson, CEO

Annual Revenues:
Undisclosed

Major Investors *(if a public company, please provide trading symbol and exchange).*

In 2007, more than $40 million of private equity funding was led by TPG Growth and TPG Biotechnology Partners. Cargill, Inc and Materia, Inc are also minority shareholders.

Type of Technology(ies)

Elevance's proprietary patent-protected technologies transform renewable plant-based oils into specialty, high performance green chemical products without the environmental risks of traditional petrochemical solutions. Elevance's innovative technology is based on the work of Nobel Laureate Dr. Robert H. Grubbs, who pioneered the olefin metathesis catalyst development at The California Institute of Technology. Elevance's proprietary technology delivers a broad portfolio of high performance products targeted at meeting customer needs in three large market platforms:

- Consumer Ingredients and Intermediates: NatureWax® and novel performance waxes, ingredients for personal care products and intermediates for detergents, cleaners and other consumer products
- Antimicrobials: agricultural fungicides, personal care preservatives, consumer and industrial disinfectants and antimicrobials

- Lubricants, Additives, Specialty Fuels: high performance lubricant base oils, lubricant and fuel additives, and advanced biofuels

Feedstocks:
Elevance technology can use multiple renewable oil feedstocks, including palm, mustard/canola, soybean, algae, jatropha or waste oils.

Fuel Type:

Elevance's biorefinery will (production starts in 2011) produce novel specialty chemicals, oleochemicals and advanced biofuels including green diesel and biodiesel. This commercial technology combines low capital investment with attractive unit level economics and delivers a high value suite of products providing opportunities for both direct replacement and new higher performance alternatives resulting in compelling economic returns.

Fuel Cost (if applicable - per US gallon): Elevance's biorefinery simultaneously produces a high value suite of chemicals and fuels from its biorefinery which is profitable without subsidy or mandate.

Offtake partners
See partnerships described below

Co-product
The Elevance biorefinery will produce linear alpha and internal olefins, novel specialty chemicals, and oleochemicals.

3 Top Milestones for 2009-10

1. (2009) Elevance Renewable Sciences Announces $1 Million Partnership With Trent University Biomaterials Research Laboratories

2. (2009) Elevance Renewable Sciences Receives Biorefinery Grant From the U.S. Department of Energy

3. (2010) Elevance Renewable Sciences Announces Joint Venture With Wilmar International To Build World Scale Biochemical Refinery

3 Major Milestone Goals for 2011-13

1. Completion of construction and start-up of biorefineries in Asia and North America
2. Expansion of the market demand and partnerships in specialty chemicals
3. Announcements regarding additional biorefineries

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

Elevance was created on the premise that a high performance, renewable, capital light, partnership-based business model will provide a unique market position based on a significant and sustainable advantage in the specialty chemicals market. The company has achieved rapid growth as a result and continues to focus on establishing unique partnerships and collaborations. Elevance has established feedstock, technology and manufacturing as well as market partnerships, working with the following innovative industry leaders to accelerate the production and commercialization high performance renewable chemicals:

- Wilmar International, Singapore
- Saskatchewan Canola Development Commission (SaskCanola), Canada
- United Soybean Board (USB), United States
- Trent University, United States
- Dow Corning Corporation, United States
- Tetramer Technologies, LLC, United States
- United States Department of Energy, United States

Competitive Edge(s):
By simultaneously producing a suite of high value chemicals and fuels from any of several different feedstocks, Elevance's biorefinery has a distinct economic advantage over other processes, as demonstrated by its ability to be profitable without subsidies. Elevance has a strong intellectual property position, demonstrated by the Nobel Prize awarded to Dr. Robert Grubbs in 2005 for his work developing the core technology, metathesis, which Elevance uses. In addition to its large patent portfolio, Elevance has extensive proprietary knowledge, deep experience from our leadership team and employees and large, strong investors. Elevance's business model of collaboration leverages the significant strengths of our partners, like Dow Corning and Wilmar International. Finally, the speed at which we have and are commercializing our business creates a significant advantage.

Distribution, Research, Marketing or Production Partnerships or Alliances.
In addition to its partnerships (listed above), Elevance uses two competitively advantaged manufacturing models:

- The Elevance biorefinery: The first full biorefinery analogous to petrochemical refineries. Unlike other biorefineries being developed, the Elevance Biorefinery leverages known technologies utilizing common processes used within petrochemicals, biodiesel and oleochemical infrastructures. The Biorefinery provides the opportunity for low cost conversion of existing assets enabling speed in commercializing products.

- Capital Light Manufacturing: This cutting-edge technology is straightforward and simple. It allows Elevance to directly manufacture high performance products utilizing existing assets. Under this business model,
    - Elevance produces NatureWax® and NatureWax® Elite, a line of natural, vegetable-based, high performance waxes for use in semi or automated candle filling lines. NatureWax® products by Elevance offers the broadest and best selection of innovative, premium natural waxes available to candle makers. These include high-performance container, pillar and votive blends. NatureWax® waxes provide an environmentally friendly alternative to multi-component paraffin blends, giving customers a fully-formulated, high performance natural wax without the fat bloom and cracking issues associated with other vegetable-based waxes.

- Elevance has established a partnership with Dow Corning Corporation, a leading supplier of premium ingredients to the personal care industry, to commercialize its novel emollient technology globally. Formulators include a family of emollients that will:

    - Provide moisturization without the unpleasant, greasy feel of petrolatum and mineral oil (both petroleum-based),
    - Avoid health concerns surrounding petrolatum,
    - Be naturally derived and
    - Compatible with other components in personal care formulations.

Stage (Bench, pilot, demonstration, commercial)
The Elevance process is already commercial. The Wilmar Elevance Biorefinery will be a worldscale commercial asset in 2011. All major process steps for the biorefinery have been demonstrated at truckload or larger scale on a non-integrated basis.

Website URL www.elevance.com

Enhanced Biofuels

Company description:
Houston-based alternative fuels technology Company that has developed the HS Reactor System. This system can process and upgrade high acidity, biomass-based and conventional feedstock into higher value advanced biofuels and refinery ready feed

Address:
9337B Katy Freeway, No. 378 / Houston, TX 77024

Year Founded:
2007

Chief Executive Officer / email:
Roman Wolff

Annual Revenues:
N/A

Major Investors
Self-funded

Type of Technology (ies):
Enhanced Biofuels proprietary technology uses temperature, pressure, catalyst and a unique reactor design to process and upgrade high acidity biomass based feedstock into refinery ready feed and conventional feedstock into higher value advanced biofuels (biodiesel)

Feedstock:
High acidity biomass based (pyrolysis oil, biocrude, bio oil) and conventional feeds (up to 100% FFA) including oils, fats and greases

Fuel Type (if applicable):
Advanced biofuels (biodiesel) from conventional feedstock and refinery ready feed from high acidity biomass based feedstock

Fuel Cost (if applicable - per US gallon):
Biodiesel breakeven price is about $1.60 per gallon using Enhanced Biofuels technology, based on current prices for DDG oil, yellow grease and current RINs. Cost of refinery ready feed generated using Enhanced Biofuels technology is estimated at $1.25 per gallon based on non-traded biomass at $55 per dry ton and 100 gal of bio oil per dry ton of biomass

Off take partners (if applicable)
N/A

Co-products (if applicable)
Varies depending on feedstock

3 Top Milestones for 2009-10
Secure commitments from strategic partners, strategic investors, and customers

3 Major Milestone Goals for 2011-13
Formalize the commitments, implementation of first semi-works or commercial installation, and build company's infrastructure

Business Model: Technology Licensor

Competitive Edge(s):
Enhanced Biofuels proprietary technology is robust, cost effective ($0.20 to $0.50 per gal operating cost) and can process and upgrade a wide range of high acidity biomass based and conventional feedstock including: pyrolysis oil, biocrude, oils, fats, and greases. Additionally, streamlined equipment design allows for cost effective ($0.20 per gal of capacity) and quick technology implementation (6-8 months) via retrofit of existing facilities to produce higher value advanced biofuels and refinery ready feed that drop into existing infrastructure. Commercial roll out will include collaboration arrangements with established engineering companies

Distribution, Research, Marketing or Production Partnerships or Alliances:
N/A

Stage:
Pilot / Early commercialization

Website URL:
www.enhancedbiofuels.com

ETH Bioenergia

Based in: Brazil

Business:
Ethanol developer and producer, subsidiary of Odebrecht.

Model:
Owner-operator, JV partner.

Past milestones:
Signed a three year agreement with Braskem to supply 40 million gallons of ethanol to the petrochemical giant. ETH's management said that the off-take deal would take effect in the second half of 2010.

Brazilian conglomerate Odebrecht will invest $581 million, via its ETH Bioenergia subsidiary, in three ethanol plants in Mato Grosso do Sul state. The plants will have a combined capacity of 15 million tons of sugarcane. The plants will manufacture sugarcane, ethanol and will produce energy from sugarcane bagasse.

Future milestones:

Two plants in Nova Alvorada do Sul will be ready for the 2009 and 2010 harvest seasons, while a third plant in Nova Andradina will be operational by 2011. This investment brings Odebrecht's holding to eight plants in Brazil.

In 2008, Odebrecht agreed with Angola-based Sonangol and Damer to invest US$200 million in sugar ethanol and electricity projects in Malanje province. The project will cover 30,000 acres, of which 20,000 will be for sugar cane and the remainder for an ethanol plant and for crop rotation land. The joint venture will produce two million tons of cane, producing 160,000 tons of sugar, 50,000 cubic meters of ethanol and 140 megawatts of electricity per year. Damer and Odebrecht will each hold 40 percent of the venture and Sonangol will have the remaining 20 percent. The venture is known as Biocom.

On schedule to increase its sugarcane crushing capacity from 3.6 million tonnes annually in 2008 to 45-50 million tonnes per year by 2016. The company also said that it expects to have more than $500 million in debt financing in place by December through the Brazilian national development bank (BNDES) for the construction of three proposed ethanol plants. The company aims eventually to have 10 mills in place by 2016 in Mato Grosso do Sul, Minas Gerais and Sao Paulo states.

GEM Biofuels

Based in: Madagascar

Business:
GEM BioFuels is initially focusing on the establishment of 'company managed' plantations of Jatropha trees in Madagascar and the extraction of the vegetable oil that is produced from its seeds as this oil is well suited to use in the production of biodiesel.

GEM BioFuels has been established to supply jatropha-based feedstock to the rapidly growing global biodiesel market. The Directors believe that one of the most significant potential constraints on the growth of this market is the relatively limited supply of biodiesel feedstock, and that this provides a significant commercial opportunity for the Company.

Model:
Owner-operator, in parnership with communes.

Past milestones:
Entered into 18 agreements with Communes in relation to 452,500 hectares of land suitable for the establishment of plantations in Madagascar, which provide it with the exclusive right to establish Jatropha plantations on the land.

To date approximately 13,300 hectares have been planted.

Future milestones:
In addition GEM BioFuels has an agreement in relation to 40,000 hectares containing natural forest, including significant numbers of mature wild Jatropha trees. Separately, the Company also has informal arrangements with a number of individuals for the delivery of wild seed to the Group's storage facility.

Metrics:
The Company has secured 50 year agreements giving exclusive rights over 452,500 hectares (in excess of 1 million acres) to establish plantations, ranging in size from 2,500 - 50,000 hectares with a further 40,000 hectares of natural forest containing substantial numbers of mature Jatropha trees.

Genera Energy

Company description:

Genera Energy is a for-profit limited liability company wholly owned by the University of Tennessee Research Foundation. Genera provides a vehicle to leverage state and federal funding with private research and development investments, strategic partnerships and collaborations to further research, economic development and clean energy objectives. Genera is focused on developing integrated biomass supply chain solutions and strategic partnerships to advance the bioenergy industry.

Genera's portfolio of clean energy projects include:

- Contracting with farmers to produce 6,000 acres of switchgrass on privately owned farms in East Tennessee.
- Construction and operation of a demonstration-scale cellulosic ethanol biorefinery in Vonore, Tennessee. The biorefinery is operated in conjunction with DuPont Danisco Cellulosic Ethanol.
- Construction and operation of Tennessee's Biomass Innovation Park, a research, demonstration and development campus in Vonore, Tennessee that focuses on purpose-grown energy crops and integrates the entire biomass supply chain in one location. The Biomass Innovation Park includes harvesting, handling, storage, densification, transportation, pre-processing and conversion.
- Partnership with an energy crop seed company.
- Establishment and management of the Tennessee Biomass Supply Cooperative, a new generation farmers' cooperative.
- Genera Capital, a new subsidiary that is the venture funding arm of Genera Energy.

Address:
2450 EJ Chapman Drive, Suite 216, Knoxville, Tennessee 37996

Year Founded:
2008

Chief Executive Officer:
Dr. Kelly Tiller

Annual Revenues:
Grants and contracts; minor switchgrass sales

Major Investors *(if a public company, please provide trading symbol and exchange).*
State of Tennessee

Type of Technology(ies)

- Integrated and comprehensive biomass to biofuels and bioproducts.
- Integrated switchgrass supply chain solutions (seeds, production, management, harvesting, storage, transportation, and pre-processing).

Feedstocks:
Switchgrass, woody biomass and other purpose-grown energy crops.

Fuel Type:
Cellulosic ethanol; biochemicals and bioproducts from lignin.

Fuel Cost (if applicable - per US gallon): *(If you do not manufacture or have long-term stable feedstock pricing, please use the latest December futures contract pricing for traded feedstocks, or $55/ton for untraded biomass – or provide notes on your own feedstock pricing assumptions).*
Undisclosed

Offtake partners (if applicable)
Undisclosed

Co-products (if applicable)
Chemicals and products from lignin

3 Top Milestones for 2009-10

1. Grand Opening – Demonstration-Scale Cellulosic Ethanol Biorefinery – January 29, 2010 in Vonore, Tennessee.
2. Biomass Innovation Park Groundbreaking in Vonore, Tennessee – July 29, 2010.
3. Formed the first value-added processing cooperative for biomass feedstock, the Tennessee Biomass Supply Cooperative.

3 Major Milestone Goals for 2011-13

1. Production of cellulosic ethanol from switchgrass at Vonore biorefinery.
2. Completion of Biomass Innovation Park, in Tennessee and validation of regional aggregation depot business model for sustainable biomass supplies, co-product processing and pre-processing.
3. Use the Vonore biorefinery to demonstrate new improvement and optimization for commercial development.
4. Begin construction on the first commercial-scale switchgrass to ethanol biorefinery project in Tennessee.

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

- Biomass feedstock solution provider
- Technical Licensor
- Project Developer

Competitive Edge(s):

- Owner of the only demonstration-scale cellulosic ethanol biorefinery operating on multiple biomass feedstocks.
- Developer of unique Biomass Innovation Park that integrates and optimizes the entire biomass supply chain in one location, spanning from the field gate to the biorefinery gate, including biomass receiving, handling, convergence, storage, pre-processing and densification.
- Partner with DuPont Danisco Cellulosic Ethanol.
  Affiliated with the University of Tennessee Institute of Agriculture, with access to license all clean energy Intellectual Property.
- Manager of unprecedented state funded Tennessee Biofuels Initiative.
- Partner with the nation's largest State Farm Bureau.

Distribution, Research, Marketing or Production Partnerships or Alliances.

- Production Partner – DuPont Danisco Cellulosic Ethanol
- Research Partners – John Deere, Vermeer, AGCO, Case New Holland, Oak Ridge National Laboratory, US Department of Energy, US Department of Agriculture, and University of Tennessee
- Alliances – State of Tennessee, University of Tennessee, Tennessee Farm Bureau

Stage (Bench, pilot, demonstration, commercial)
Demonstration/Pilot; Pre-Commercial

Website URL
www.generenergy.net

GeoSynFuels

Based in:
14818 W. 6th Ave, Suite A1, Golden, CO 80401

Year Founded:
2006

Annual Revenues:
None

Technology:
Simultaneous Saccharification and Solid-State Fermentation SSSSF

Fuel type:
Ethanol and potential for other advancd biofuels such as biobutanol

Major investors:
Private equity - Large net worth individuals.

Past milestones:

1. Complete engineering design for pilot plant

2. Develop effective 5-carbon fermentation microbe and process

3. Establish in-house proprietary pretreatment capabilities for large scale testing.

Future milestones:

1. Build and operate pilot facility.

2. Commence construction of first commercial plant.

3. Develop business opportunities outside USA

Business model:
Build, own and operate.

Fuel cost:

Costs are highly dependant on the feedstock under considerration and the particulars of the process. GeoSynFuels has several processing routes that range from treating beetle killed pine for both hemicellulose and cellulose conversion and fermentation to treating waste fiber (MSW, waste paper, etc) whcih requires no pretreatment. The beetle kill process has a projected price of $1.25 per gallon while the waste fiber process will be less than $1.

Competitive edge:

Much of GSF's competitive advantage comes from the simplicity and scalability of the process but additional advantages come from a strategy of rapid scaleup, recognition of the existing commercialization barriers and strategic industrial partnerships. We project capital costs 5 -10X lower than competing processes and operating costs in the $1 per gallon range. These are made possible by:

Focus on low cost feedstocks; Co-location benefits High yields; Low energy usage; Low water usage; Highly scalable.

Alliances and Partnerships: GSF has commercial alliance with a large pulp and paper producer - we have completed a feasibility study for the processing of waste fiber at one of their sites.

GSF has an alliance with Novozymes who provide our enzymes. We have obtained considerable assistance from this group and have tested many of their beta versions in our process.

GSF has a development agreement with Clean Tech Biofuels to test their MSW pretreatment materias in our process.

GSF has formed a JV with the Donald Danforth Plant Science Center called Agrius BioForms LLC. This group is focused on the development of seed based enzymes and other industrial proteins.

GSF has several MTA's in place from groups like NREL, Forest Products Lab, Ceres etc...

Development stage GeoSynFuels is currently a development company focused on the construction of our continuous pilot plant. We have applied for a DOE grant to fund this development but have a contingency plan for Jan 1 2010 should we not be awarded a grant.

Website: www.geosynfuels.com

Glycos Biotechnologies

Company description:
GlycosBio is a biochemical company focused on the production of renewable industrial chemicals using advanced metabolic engineering and fermentation techniques that convert a diversified feedstock portfolio into higher value chemicals. GlycosBio's suite of bio-based chemicals provide industrial customers and partners with bio-based chemical building blocks, which are direct economic substitutes for petrochemical-based products.

Address:
711 Leverkuhn, Houston, TX 77005

Year Founded:
2007

Chief Executive Officer and contact email:
Richard C. Cilento Jr.

Annual Revenues:
Confidential

Major Investors:
Draper Fisher Jurvetson and DFJ Mercury

Type of Technology(ies):
GlycosBio has developed a portfolio of microorganisms and industrial processes that can biologically make biofuels and biochemicals from a variety of non food-based, low value feedstocks including glycerol, cellulosic sugars, plant oils, algae and fatty acids. This microorganism portfolio approach not only eliminates the risk of a sugar and food-based only feedstock strategy but also provides flexibility in targeting a variety of end chemicals.

Feedstocks:
A key differentiator of GlycosBio's platform is its ability to utilize diverse feedstocks, some of which in the past have been very difficult to process biologically. These non food-based feedstocks are available today including glycerol from corn ethanol – DDGS; glycerol from sugar cane ethanol – Vinasse; and glycerol and fatty acids from oleochemical and biodiesel plants, to name a few.

Fuel Type (if applicable):
GlycosBio has engineered a series of metabolic pathways that produce nearly a dozen chemical intermediaries including advanced ethanol, isoprene, succinic acid, propanediols and lactic acid.

Fuel Cost (if applicable - per US gallon):
Using GlycosBio's Glycerol to Ethanol Manufacturing ("GEM") process, plants with available feedstocks can produce ethanol at approximately a $1.00 per gallon based on the $55/ton figure.

Offtake partners (if applicable)
Confidential

Co-products (if applicable)
Valuable co products including hydrogen, biologically derived carbon dioxide, and biomass can be leveraged for energy or additional revenue and margin.

3 Top Milestones for 2009- 10
1) Q4 2009: operation commenced at the GlycosBio pilot facility with an annual fermentation capacity of up to 150,000 liters.
2) Q1 2010: successful production of lactic acid and ethanol was achieved in GlycosBio's pilot facility.
3) Q2 2010: plans to construct a biochemical plant and biotechnology research and development facility in Malaysia were announced marking GlycosBio's first expansion internationally.

3 Major Milestone Goals for 2011- 13
1) Q4 2012: complete the construction of GlycosBio's Malaysian facility marking the company's first commercial scale facility.
2) Q1 2013: commission additional commercial scale facilities in Latin America and the US.

Business Model:

GlycosBio has two business models.
• First, GlycosBio can deploy its platform in an owner-operated business model. The Company's Bio-XCell facility in Malaysia is an example of this model.
• Second, GlycosBio partners with existing industries under a joint venture co-location framework. Partnership opportunities exist with petrochemical companies, oleochemical companies, enzyme producers and biofuel producers including ethanol and biodiesel plants.

Competitive Edge(s):

GlycosBio's competitive advantages can be shared with industry partners through the joint venture co-location business model framework.
• The Company's co-location business model creates the ability to leverage existing partner plant assets lowering implementation costs and creating a faster time to market.
• The Company's flexible plant design and flexible feedstock strategy protects against

end product commodity risk as well the market risks associated with food-based feedstocks.

- The Company's microorganism portfolio and flexible plant design provides a strategic biochemical alternative platform to companies who are not aligned with sugar-based feedstocks.

Distribution, Research, Marketing or Production Partnerships or Alliances:
In 2010, GlycosBio partnered with Malaysian-based BioXCell to build an industrial biochemical plant and biotechnology research and development facility.

Stage: *(Bench, pilot, demonstration, commercial)* GlycosBio's microbial platform has been successfully benched and piloted in the Company's pilot facility.

In addition, GlycosBio's Bio-XCell facility will be at commercial scale in Q4 2012.

Website URL
www.glycosbio.com

GreenShift Corporation

GreenShift develops and commercializes clean technologies designed to integrate into and leverage established production infrastructure and distribution channels to address the financial and environmental needs of its clients by decreasing raw material needs, facilitating co-product reuse, and reducing the generation of wastes and emissions.

GreenShift's founding mission is to build value by using its technologies to catalyze disruptive environmental gain. GreenShift believes that the first, best and most cost-effective way to achieve this is to develop technology-driven economic incentives that motivate large groups of people and companies to make incremental environmental contributions that are collectively very significant. GreenShift's plan to achieve this goal is based on the extraction, beneficiation and refining of biomass-derived co-products that create value-added renewable energy production opportunities capable of shaving meaningful amounts of carbon and cost off of existing liquid fuel supply chains.
Since 2004, GreenShift has invented, developed and commercialized potent new cleantech that enables GreenShift and its clients to "drill" into the back-end of first generation corn ethanol plants to tap into a new reserve of inedible crude corn oil with an estimated industry-wide output of about 20 million barrels per year. This corn oil is a valuable second generation feedstock for use in the production of biodiesel and renewable diesel – advanced carbon-neutral liquid fuels, thereby enhancing total fuel production from corn and increasing ethanol plant profits.

GreenShift's patented and patent-pending Corn Oil Extraction Technologies are widely considered to be the quickest and best path for margin improvement for first generation corn ethanol producers today. GreenShift's extraction technologies increase biofuel yields per bushel of corn by 7% while reducing the energy and greenhouse gas (GHG) intensity of corn ethanol production by more than 21% and 29%, respectively.

These benefits correspond to increased ethanol producer income of about $0.12 per gallon of ethanol produced at current market prices, and can be realized for less than 10% of the capital cost of the host ethanol plant. No technologies have been developed for corn ethanol producers that begin to approach even a fraction of these results in the history of the ethanol industry.

Over 20% of the U.S. ethanol industry is using GreenShift's patented and patent-pending extraction technologies today. At full participation by the ethanol industry, GreenShift's commercially-available technologies can give way to the disruptive gains that GreenShift was founded to achieve by sustainably producing globally-meaningful quantities of new carbon-neutral liquid fuels for distribution through existing supply chains and combustion in our nation's boilers, generators and engines;

- displacing more than 20 million barrels per year of crude oil;

• saving up to 10 trillion cubic feet per year of natural gas;
• eliminating tens of millions of metric tons per year of greenhouse gas emissions; and
• infusing up to a billion dollars per year of cash flow into the corn ethanol industry - the foundation of North America's renewable fuel production capability.

GreenShift is focused today on supporting integration of its patented and patent-pending corn oil extraction technologies into as much of the ethanol fleet as possible. GreenShift also maintains its strong commitment to continued innovation and has many additional patents pending for its "Backend Fractionation" portfolio of strategically-compatible cleantech designed to continue pressing the corn ethanol industry into increased sustainability and global competitiveness.

Address: New York
Year Founded :2004

Annual Revenues: 2009 – about $5,000,000 (projected); 2008 – $23,600,000; and, 2007 – $14,700,000

Type of Technology(ies)
BACKEND FRACTIONATION TECHNOLOGY PORTFOLIO
Technology Function Status - Corn Oil Extraction Extraction of corn oil from ethanol co-product — Commercially Available
Transesterification- Integrated refining upgrade for corn oil extraction facilities — Commercially Available
Cellulosic Oil™ Oleaginous microbes convert biomass into oil and protein —Pilot Stage
Desiccation/Cavitation Conditions corn and qualified biomass for increased yields —Pilot Stage
Biopolymer Extraction Extract and convert byproducts into bioplastics — Pilot Stage
Photonic Fuels™ Reform exhaust carbon dioxide into natural gas and liquid fuels — Bench Stage

Fuel Type:
Corn Oil Extraction Produces inedible corn oil feedstock for conversion into biodiesel or renewable diesel
Transesterification Biodiesel
Cellulosic Oil™ Produces lipids for conversion into biodiesel or renewable diesel
Desiccation/Cavitation Enhances Corn Oil Extraction and Cellulosic Oil™ yields for biodiesel or renewable diesel
Photonic Fuels™ Methane (for use on-site in lieu of fossil fuels) and liquid fuels (for sale off-site)

Major Investors
YA Global Investments, L.P.

Past milestones
A. Complete financing for construction of new facilities based on patented and patent-pending corn oil extraction technologies.

B. Form strategic partnerships to accelerate and amplify execution of go-to-market strategy for corn oil extraction technologies, and to enhance the development of pilot and bench stage technologies.

C. Restructure $40 million in historical debt raised during 2004-2007 to develop and commercialize extraction and refining technologies.

Future milestones
A. Build value for GreenShift's clients and shareholders by building as many corn oil extraction facilities as possible, as quickly as possible, with a view towards achieving 100 million gallons per year of installed corn oil extraction capability within 5 years.

B. Continue to improve upon patented and patent-pending corn oil extraction and related technologies (i) to maximize yield, (ii) to decrease cost, energy and carbon, and (iii) to enhance the value proposition to GreenShift's clients and shareholders.

C. Make a meaningful contribution to shifting the corn ethanol industry into increased economic and environmental sustainability by demonstrating the commercial viability of GreenShift's full Backend Fractionation technology portfolio in collaboration with strategic partners.

Business Model:
GreenShift's business model is based on Feedstock Ownership and Margin Protection. A sustainable mining business requires a cost-effective and reliable source of ore; a sustainable petrochemical refinery requires a cost-effective and reliable source of petroleum; and a sustainable biofuels business requires a cost-effective and reliable source of feedstock. GreenShift uses its technologies to sustainably produce biomass-derived products by targeting, extracting, acquiring and refining cost-effective and reliable raw materials. GreenShift does not generally sell equipment based on its technologies, nor does it provide services based on its technologies, nor does it license its technologies in any conventional way. Instead, GreenShift licenses its patented and patent-pending corn oil extraction technologies to corn ethanol producers in return for the right to purchase the extracted oil for the life of the use of the technology. GreenShift earns money by buying and selling or refining the extracted oil. The price paid for the oil corresponds to a substantial premium to the value of the oil to participating ethanol producers prior to extraction. At this rate, GreenShift retains about 20% of the value of the extracted oil.

Fuel Cost (per gallon)
The capital cost of corn oil extraction can range from $1.50 to as high as $3.00 per gallon

of installed capacity, depending on the specific operating conditions of each host ethanol plant, and the desired oil yield and energy savings.

Competitive Edge(s):
GreenShift's primary competitive advantage is its use of its technology positioning to deliver powerful competitive advantages to the renewable fuels industry – increased sustainability, reduced cost, reduced energy, and reduced carbon, all through the industry's existing production assets.

A. For GreenShift's Ethanol Clients – increased revenue and earnings; decreased commodity and financial risk; increased nutritional content of DDGS; enhanced energy balance with less carbon emissions; safe harbor from tight margin environments; strong cost advantage; and, increased sustainability and competitiveness.

B. For GreenShift's Partner Biodiesel and Renewable Diesel Producers – reliable large volume supply of previously unrecovered feedstock (versus no available feedstock); sustainable feedstock available at rates indexed to diesel fuel prices; safe harbor from tight margin environments; strong cost advantage; and, increased sustainability and competitiveness. For context, with a majority of plants adopting GreenShift's patented and patent-pending corn oil extraction technologies, and with an estimated 11.5 billion gallons of ethanol produced, the ethanol industry could be saving about 100 million MMBtu per year while producing more than 2.8 million tons of inedible corn oil per year (over 736 million gallons). The result at current market prices is staggering: the ethanol industry could be producing an additional $0.12 per gallon of ethanol produced, or over $1.1 billion, in additional profit today by using GreenShift's patented and patent-pending corn oil extraction technologies. Moreover, at 736 million gallons of extracted corn oil potential, backend corn oil could increase the output of the entire existing domestic production of biodiesel several-fold.

Distribution, Research, Marketing or Production Partnerships or Alliances.
GreenShift's partnerships include relationships with ethanol, biodiesel and renewable diesel producers. GreenShift is collaborating with corporate partners relative to its efforts to improve on the value proposition of its corn oil extraction and Backend Fractionation technology portfolio. In addition, GreenShift has developed partnerships with a number of academic institutions relative to its ongoing technology development and commercialization efforts.

Stage
Corn Oil Extraction Technologies – Commercial

Website URL
www.greenshift.com

HeroBX

Based in: 1540 East Lake Rd. Erie PA, 16511

Year Founded: 2006

Annual Revenues: $200 million

Technology:-
Transessterification

Fuel type:-
Biodiesel

Major investors:
Samuel P. Black III

Past milestones:

Surpassed nameplate capacity of 45 million gallons. Selected fuel supplier to Green Flight (b100 flight Las Vegas – Orlando), Perfected use of 15 feedstocks, reached profitability

Future milestones:

Execute 10 million gallon expansion, commercialize use of Camilina feedstock, execute algae investment , acquire 2nd plant

Business model:
Owner operator

Competitive edge:-
Multiple feedstock blending technology, Proprietary filtration systems, Logistics (rail, port, truck), Quality, Global reach

Alliances and Partnerships:
Logistics plus, Green Flight International, Desmitt Bellestra

Development stage:
Commercial

Website:
HEROBX.com

J P I Fuel Enterprise

Company description: J P I Fuel Enterprise is a renewable energy company that develop a biomass base fuel that offers a lower prize and cleaner alternative fuel to coal for heat producing industries such as thermal power plants, cement factories, municipal/ city waste incinerators, steel /blooming mills or any direct stationary heavy industries that requires tremendous amount of heat for operation. Patent application on process at Philippine Intellectual Patent Office .

Address: # 65 Cablong,Pozorrubio,Pangasinan,Philippines

Year Founded: March 2009

Chief Executive Officer and contact email:
Jaime P. Imbat, President, CEO

Annual Revenues: Pre-revenue.

Type of Technology(ies)
Enzymatic Hydrolysis

Feedstocks: All unutilized organic waste that stay rotten or burn and no cutting of trees or dedicated energy crop plantation, no treat for food stock security and feed stock security, raw materials grows by its on world wide especially on third world countries.

Fuel Type: Solid firewood biomass base fuel and offers an inexpensive .renewable alternative to coal. It is approximately 50% cheaper than coal and emits neutral CO_2 emissions, reduce harmful emissions of sulfur dioxide(SO_2),nitrogen oxide(NO_2) and particulate number(PM).

Co-products (if applicable)

1- Organic Fertilizer (pulvorize fuel ash dispose) can eliminate usage of chemical fertilizer.
2- Biofuel- juice produce during manufacturing process.

3 Top Milestones for 2009-10 though the company is on its infancy stage ,it is now on negotiation to deliver

1. One thousand one hundred (1,100) tons daily to a cement factory with four branches located to different parts in our country which stop operation due to high cost of coal (almost 95% of heat producing industry in our country stop operation and considered a sunset industry)
2. It is also in midst of negotiation with the National Power Corporation (NAPOCOR) to deliver 6 million metric tons annually to its thermal power plant located through-out the Philippines.

3. Also in negotiation to deliver thousands of tons to foundry companies in metro Manila.

3 Major Milestone Goals for 2011-13

1. Direct replacement for coal. Proliferation of new coal fired plants(2,000 plus new plants with capacity of 1,200 megawatt per plant) world wide with in three years to accommodate emerging market growth and satisfy demand for electric car.
2. As all nations has problems on city/ municipal waste, the product is also intended to incinerate and can pulverize any solid waste.
3. It can be re-franchise world wide.

Business Model: Owner-Operator

Competitive Edge(s):
There are products available that are similar to JPI fuel such as wood pellets, wood chips briquettes, saw dust and grass briquettes as well as numerous biomass base fuel products and processes . However none can serve as a complete replacement for coal as JPI Fuel can, none uses exclusive waste organic materials and doe's not requires dedicated energy plants plantation and no cutting of trees for raw materials grows by its own . It can reduce 80% of greenhouse effect that causes climate change due to pollution emission. Also none offers opportunities of millions of job for it will be the cheapest simplest and safest form of energy ,for in an ideal world energy would be plentiful and cheap, in-in ideal world we would not to worry about running out of energy, the cost of energy or leaving our children the environmental problems like the pollution and depleted resources, leaving our children the catastrophic effect of climate change cause by the fuel coal that emits 6 billions metric tons yearly. The JPI Fuel had prepared for the next generation, handling them tools they can use to move forward, to explore, to invent and to enjoy life.

Distribution, Research, Marketing or Production Partnerships or Alliances. JPI will be positioned as a replacement for coal. Therefore, the Company's global marketing plan will be a three-step plan with the goal of gaining market share with the heat-producing industries in the Philippines, targeting rapidly-growing and highly industrialized Asia/Pacific (APAC) countries – particularly those dependent on imported coal and duplicating that strategy in the other regions. The first step will be to sell JPI Fuel direct in the Philippines.

The high cost of coal has been a recurring problem for Philippine Industry. According to the Philippine Department of Energy, the country produces approximately 2.5 metric tons of coal. However, annual consumption is 20 million metric tons. Therefore approximately 17.5 million tons must be imported which leads this industry vulnerable to trade embargoes, high price imported coal and shortages. Is the major produces of electricity , and requires almost 6 (six) million metric tons of coal annually.

They along with other heat –producing plants in the Philippines are under pressure to replace coal with alternative energy products to reduce pollution and reduce ash fall outs in their respective areas.

In year 2005,the government launch a program to decrease the Philippines dependence on coal by accelerating exploration, development and utilization of indigenous energy resources, intensifying the development of renewable energy resources such as biomass, solar,wind,and ocean resources, increasing the use of alternative fuel. In fact, Napocor officials have told JPI that if it can deliver six million tons yearly to energize all Philippines Thermal Power plant(3,198 mega watts), the Philippines will be the first country in the world to virtually eliminate the need to use coal in power plants. Therefore JPI Fuel is well positioned to gain significant domestic market share since it offers a viable alternative to coal.

The second step will be to expand in APAC by establishing joint ventures with partner companies in China, India,Japan,Taiwan,South Korea and Malaysia, licensing the product and technology to them.Demand for JPI Fuel on China alone could reach 6 billion of tons annually because coal fired –power plants built in China account for two thirds of more than 560 plants build in 26 nations between 2002 to 2006. As a result ,China is responsible for increasing annual CO2 emissions, and is under pressure from the world community to reduce harmful emissions. However, China is resisting because retooling plants and and changing procedures is expensive , and will hinder industrial growth. This is a case where JPI Fuel would be seen as the perfect solution because China could reduce pollution and emissions with out hindering industrial growth.

India is another key target market because the International Finance Corporation (IFC) and Asian Development Bank have approved billions of dollars to built eight thermal power plants to supply electricity to industrial and agricultural users through-out the country. The first of the power plants 800 mega watt unit is expected to be commissioned in mid 2011,while the other units will be launched at intervals of four months each. In this case, JPI Fuel would be seen a the perfect solution because it would prevent India from having the same problems China is now experiencing without hindering industrial growth.

Japan . Taiwan, South Korea and Malaysia are lucrative market because they are highly industrialized and completely dependent on imported coal . So , in this cases ,JPI Fuel could be seen as a way to mitigate emissions problems and decrease dependence on coal.

The third step is to apply this strategy to other regions, Brazil ,Central and Eastern Europe are key market because these areas are experiencing rapid growth. Therefore, they will see JPI fuel as a way to minimize industrial emissions without hindering economic growth. Since the United States, Canada and Western Europe are highly industrialized, they will see JPI Fuel as a way to decrease emissions from existing plants without hindering economic growth.

Stage: Pilot

Lotus/Jaguar

Based in: England

Business:
Engine developer

Model:
Owner-operator.

Past milestones:
Lotus Engineering and Jaguar partnered to develop an advanced biofuel engine which they call Omnivore. The single-cylinder Omnivore engine will utilize multiple biofuels, including a new alcohol fuel to be announced by the team. A two-stroke process with injection of sustainable alcohols will enable to engine to obtain maximum efficiency. Software controls the compression ratio –monoblovk construvtion (so separate cylinder head) allows for very high compression rations and cool high rpm running.

Future milestones:
Commercialization of prototype.

Metrics:
Can obtain higher MPG than straight gasoline using biofuels.

OPX Biotechnologies, Inc.

Company description:
OPX Biotechnologies, Inc. (OPXBIO) is a Colorado-based company using its proprietary, leading- edge technology to manufacture renewable bio-based chemicals and fuels that are lower cost, higher return and more sustainable than existing petroleum-based products.

With unprecedented speed and capital efficiency, in just 18 months OPXBIO has developed and piloted the microbe and bioprocess that will produce its first renewable chemical product – BioAcrylic – at 25 percent lower cost than petro-acrylic and with a 75 percent reduction in greenhouse gas emissions. Today's petro-acrylic has an $8 billion global market in applications such as paints, adhesives, diapers and detergents. BioAcrylic will advance to pre-commercial scale demonstration with a strategic development partner in 2011 on the way to full commercialization in 2014.

The company's second product is diesel fuel bio-processed from carbon dioxide and hydrogen. The U.S. Department of Energy has awarded OPXBIO $6 million to support this development.

Address:
2425 55th Street, Suite 100, Boulder, CO 80301

Year Founded:
2007

Chief Executive Officer and contact email:
Charles R. (Chas) Eggert ceggert@opxbio.com

Annual Revenues:
OPXBIO is pre-revenue at this stage, expecting commercialization of its first product in 2014.

Major Investors *(if a public company, please provide trading symbol and exchange)*: Mohr Davidow Ventures, Braemar Energy Ventures, Altira Group, X/Seed Capital **Type of Technology(ies):**
OPXBIO utilizes its proprietary, patent-pending EDGETM (Efficiency Directed Genome Engineering) technology platform to convert renewable raw materials (biomass) into biochemicals and biofuels. OPXBIO EDGETM enables rapid, rational and robust optimization of microbes and bioprocesses to manufacture bioproducts with equivalent performance and improved sustainability at lower cost compared to petroleum-based alternatives.

Feedstocks:
The flexibility of OPXBIO's technology platform enables the use of many different

renewable and sustainable feedstocks. OPXBIO's BioAcrylic product is derived from dextrose from corn or sucrose from cane. OPXBIO's diesel fuel will be bio-processed from carbon dioxide and hydrogen. Future feedstocks include cellulosic sugar from non-food crops, agricultural waste and gasified biomass/solid waste.

Fuel Type, if applicable (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc):
OPXBIO's second product is biodiesel developed thru fermentation of carbon dioxide and hydrogen. This biodiesel will also be catalytically converted to renewable diesel and jet fuel.

Fuel Cost (if applicable - per US gallon):
OPXBIO is targeting its cost of biodiesel at less than $2.50 per gallon.

Offtake partners (if applicable):
For the U.S. Department of Energy ARPA-E project, OPXBIO will partner with the National Renewable Energy Laboratory (NREL) and Johnson Matthey in developing a new, economical bioprocess to convert hydrogen and carbon dioxide into diesel and jet fuel products that can compete to replace petroleum-derived products without the need for price subsidies.

Co-products (if applicable):
Not applicable.

3 Top Milestones for 2009‒10:

- In April 2009, OPXBIO closed $17.5 million in B-round financing despite a very challenging environment; funds used for process demonstration and strategic partnering as company accelerates toward commercialization of BioAcrylic.
- In April 2010, OPXBIO won a $6 million grant for the development of biofuels by the U.S. Department of Energy through its Advanced Research Project Agency-Energy (ARPA- E); as one of 37 institutions selected from more than 500 applicants, OPXBIO received the largest grant in this round of ARPA-E project funding.
- Since beginning pilot scale development of BioAcrylic 15 months ago, OPXBIO has reduced BioAcrylic production cost by 97 percent toward the commercial target cost of $.50 per pound.

3 Major Milestone Goals for 2011‒13:

- OPXBIO will have completed successful pilot-stage demonstration of BioAcrylic, achieving target cost of $.50 per pound, or 25 percent below current cost; utilizing $35M - $50M secured from C-round financing in early 2011, OPXBIO will open demonstration plant in late 2011 (in advance of full-scale commercialization in 2014).
- Secure one or more strategic partnerships with companies that will allow OPXBIO to enhance its growth rate, reduce projected operational and capital expenditures and gain valuable technology and/or processing capabilities
- Complete pilot scale phase of biodiesel project in 2013, achieving target cost of less

than $2.50 per gallon

Business Model (e.g. owner-operator, technology licensor, fee-based industry supplier, investor):
OPXBIO intends to commercialize BioAcrylic through joint venture. OPXBIO plans to license the technology for its second product, biodiesel.

Competitive Edge(s):
Leveraging the EDGETM technology platform, OPXBIO scientists identify the genes that control microbial metabolism and then implement a comprehensive, rational genetic change strategy to simultaneously optimize microbial production pathways and vitality, as well as overall bioprocess productivity. OPXBIO EDGETM includes a first-of-its-kind, massively parallel, full-genome search technology that is 1,000 to 5,000 times faster than conventional genetic engineering methods, meaning OPXBIO creates optimized microbes and bioprocesses within months rather than years. The bottom line: OPXBIO's technology makes possible biofuels and green chemistry products that have up to 50 percent lower cost than petroleum-based alternatives. This technology will enable OPXBIO to be first to market with BioAcrylic.

OPXBIO's go-to-market strategy stands apart from many bio-based chemicals and fuels companies in that it will have an economically proven commercial microbe *before* entering demonstration phase.

Distribution, Research, Marketing or Production Partnerships or Alliances.
As mentioned above, OPXBIO is partnering with NREL and Johnson Matthey in developing its second product, biodiesel, through a project funded by a $6M grant from the U.S. Department of Energy's ARPA-E agency.

Stage (Bench, pilot, demonstration, commercial):
OPXBIO anticipates completing BioAcrylic pilot stage development by year-end 2010 and will transition to demonstration phase in early 2011.

Website URL: http://www.opxbio.com

Osage Bioenergy

Based in: Virginia

Business:
Barley ethanol producer

Model:
Owner-operator

Past milestones:
Osage Bio Energy said that it would commence construction of its Congaree Bio Energy barley ethanol plant in Union County. Capacity for the $161 million project, one of four under development by the company and among the first barley ethanol plants in the world, was not disclosed. The company said that it will partner with Carlisle Finishing on the project, building the plant adjacent to the Carlisle Finishing textile plant, share a rail switch, and utilize steam from the textile plant.

Osage Bio Energy received a $300 million investment commitment for its barley-based ethanol production plan. Texas-based First Reserve is providing the equity capital. The company's plan uses barley, a low-input winter crop in the Southeast, as a feedstock. Observers point out the higher production costs of barley ethanol and an indication from the USDA that its distillers grains may not be acceptable as livestock feed. The company indicated that two sites in North Carolina are finalists for its construction plan. Planned overall capacity was not disclosed, but the company's initial [plant in Hopewell, VA is slated for 55 Mgy.

Osage Bio Energy received the go-ahead from municipal officials in December for its Hopewell plant. Ethanol experts had said the proximity of the town to the proposed plant raises the potential of smell and the traffic from trucks bringing in feedstocks, and the vote had been rated a toss-up by observers.

Future milestones:
Completion of the Appomattox Bio Energy plant, a 65 Mgy barley ethanol plant that will be the largest in the US using barley as a feedstock. Barley is a winter crop that can be double cropped with soybeans, and produces a high quality meal in addition to fuel ethanol.

Oxford Catalysts Group

(includes Oxford Catalysts Ltd, based near Oxford, UK and Velocys, Inc., based in Plain City, Ohio)

Company description:

The Oxford Catalyst Group Develops of catalysts and microchannel reactor technology for the generation of clean fuels from both conventional fossil fuels and biomass

Address:

115e Milton Park, Oxford OX14 4RZ, UK

Year Founded:
2001: Velocys, Inc.
2004: Oxford Catalysts Ltd.
2008: Oxford Catalysts Group

Chief Executive Officer and contact email:
Roy Lipski

Annual Revenues:

£8.6 million (year ended December 2009) ($13.5 million approximately)

Major Investors *(if a public company, please provide trading symbol and exchange).*

- Battelle Memorial Institute: 16.5%
- Lansdowne Partners: 16%
- Pioneer Investments 15.7%
- IP2IPO Management Limited: 8.2%
- Dr Tiancun Xiao: 6.5% (company co-founder)
- Professor Malcolm Gree: 4.9% (company co-founder)
- University of Oxford: 3.7%
- Roy Lipski: 3.6%

Type of Technology(ies):

- Fischer Tropsch (FT) microchannel reactor technologies for the efficient, economical and environmentally friendly small scale distributed production of biofuels via biomass to liquids (BTL) and liquid fuels from gas via gas to liquids (GTL)
- Microchannel reactor technology for steam methane reforming (SMR)

- Other applications for microchannel reactors, including hydrocracking, clean chemical manufacturing, homogenisation, emulsification and distillation
- Patented OMX method for the development and preparation of tailored highly active selective and stable catalysts for use in microchannel reactors and for the generation of clean fuels from other applications.

Feedstocks:

- For biofuels: a wide range of waste feedstocks including agricultural, municipal and construction waste, forestry waste
- For gas-to-liquid fuels: stranded and associated gas from oil wells which would otherwise be reinjected, vented or flared

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc):

- Synthetic diesel and jet fuel from biomass waste feedstocks via BTL
- Synthetic diesel and jet fuel from stranded and associated gas via GTL

Fuel Cost (if applicable - per US gallon):
Depending on the feedstock used, the synthetic diesel and jet fuels produced are economic when oil prices are in the range of $50 – $70/barrel.

Offtake partners (if applicable)

Not currently applicable, but we are working with the Portuguese incorporated holding company SGC Energia to market the technology.

Co-products (if applicable)

- Certain cuts of the FT product can be used as high quality and high value synthetic lubricants for automotive applications.

- The process also produces high temperature steam which can be used for district heating or to assist the initial gasification stage of the process to enhance process efficiency.

- Some light organics are also produced. These can be used as chemical feedstocks or returned to the gasifier to assist in the gasification stage.

3 Top Milestones for 2009-10:

- A binding memorandum of understanding between the Thai state-owned energy company, PTT, and the Oxford Catalysts Group. Under the terms of the MOU, PTT will provide funding of US$5 million over 2 years to support the development and commercialisation of Oxford Catalysts Group's steam methane reforming (SMR) technology.

- Joint demonstration testing agreement (JDTA) between Velocys, Inc., offshore facility developers MODEC, global engineering firm Toyo Engineering and the Brazilian State Oil Company, Petrobras to build and operate a microchannel GTL demonstration facility in Foraleza, Brazil.

- Setting up and successful running of a BTL demonstration plant jointly operated by the Oxford Catalysts Group and the Portuguese incorporated holding company SGC Energia for the small scale distributed production of biofuels via the FT reaction at the biomass gasification facility in Güssing, Austria. The demonstration plant has been fully operational and running smoothly since August 2010 and will lead to the Oxford Catalysts Group's first commercial orders.

3 Major Milestone Goals for 2011-13

- Further demonstration of BTL technology in the USA and Europe
- Initial sales of commercial FT units for BTL processes (2011)
- Successful demonstration of GTL technology in Brazil (2011) and first sales of integrated GTL facilities (2012) for onshore or offshore applications

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)

Technology developers and licensors

Competitive Edge(s):

- Catalyst development, including OMX, a patented method, for producing highly active and more stable catalysts by enabling greater control of the particle size resulting in a narrower particle size distribution of crystallites in the nanometre diameter range which exhibit terraced surfaces. Both of these features enhance catalyst activity. OMX also produces fewer very small crystallites that could sinter at an early stage of operation. This results in greater catalyst stability.

- Microchannel process technology. The Oxford Catalysts Group has the world's largest portfolio in microchannel process technology, which potentially has a very wide range of applications, including biofuels and clean fuels production (see below), hydrocracking, distillation and homogenisation.

- Biofuels and clean fuels production, including microchannel reactor technology for the small scale distributed production of biofuels via BTL, and the small scale production of liquid fuels via SMR and GTL. Microchannel technology for hydrocracking, distillation, emulsification and homogenisation.

Distribution, Research, Marketing or Production Partnerships or Alliances.

- Memorandum of Understanding (MOU) between Oxford Catalysts Group and the Thai state energy company, PTT, for the development of microchannel steam methane reforming technology (SMR).

- Joint demonstration testing agreement (JDTA) between Oxford Catalyst Group member, Velocys, Inc., offshore facility devleopers, MODEC, Toyo Engineering and the Brazilian State Energy Company, Petrobras, to build and operate a microchannel gas to liquid (GTL) demonstration facility in Fortaleza, Brazil.

- Joint Development Agreement (JDA) between Velocys, Inc., and the Portuguese incorporated holding company SGC Energia (SGCE) to set up an FT microchannel reactor demonstration plant at the biomass gasification facility in Güssing, Austria. SGCE will place first orders for microchannel FT reactors on completion of the technical milestones during this demonstration.

Stage (Bench, pilot, demonstration, commercial)

Some of the technologies are under development (distillation, clean chemicals, homogenisation), some (BTL and GTL) are at, or approaching, the demonstration stage. Emulsification technology is at the commercial stage, and BTL technology is close to commercial.

Website URL

www.oxfordcatalysts.com
www.velocys.com

Phycal LLC

Address: 51 Alpha Park, Highland Heights, OH 44143

Year Founded: 2007

Type of technology:

Phycal is developing an integrated production system based on its patent pending technologies for growing algae and extracting energy products, primarily algal oil. Phycal is focused on delivering energy products at a market-competitive price. Algal oil can be converted into biodiesel, or refined into renewable, drop-in replacements for diesel, jet fuel, and feedstock for other energy products.

Phycal's core technologies include:

1. Olexal® Non-destructive extraction ("milking") of oil from algae.

Phycal's patent-pending non-destructive extraction process, Olexal®, milks the oil from algae while maintaining their viability. The "milked" algae are recycled to the ponds to grow more oil. Olexal® requires no dewatering, kills competitors and contaminants, and increases both biomass productivity and lipid accumulation.

2. Heteroboost™, a hybrid 2-stage phototrophic (sunlight & CO_2) and heterotrophic (fixed carbon) system for optimum economic yield of oil from algae.

Phycal's production system also deploys the patent-pending Heteroboost™ technology. It starts with a phototrophic first stage to grow biomass and lipid to optimum levels with sunlight and CO_2 and then moves algae to a heterotrophic second stage which provides fixed carbon (e.g. inedible sugar) to the algae that quickly and dramatically boosts oil and biomass. This hybrid system synergistically combines the benefits of what is achievable through purely phototrophic or heterotrophic growth.

Fuel Type:

Phycal produces commodity energy products from algae, primarily algal oil, as a feedstock for partners who will convert Phycal's algal oil to renewable diesel, biodiesel, renewable jet fuel, and renewable naphtha.

Major investors:

Logos Energy, Inc.

Past milestones:

1. In June 2008, the company opened their subpilot-scale plant. This subpilot was built to

scale-up all unit operations from laboratory-scale to the next technology readiness level. At the subpilot technology readiness level, the goal is to scale-up, develop, and integrate all unit processes into a continuous system in a relevant environment.

This is the last level necessary before implementation at the pilot/demonstration level. To achieve this, Phycal has to date installed and developed: outdoor ponds, 3 prototype iterations on Olexal® non-destructive extraction unit, 2 prototype iterations on Heteroboost™ hybrid growth system, a low-cost primary dewatering process, an aqueous extraction process, a water treatment process, a distillation process, and process logic controls. Phycal submitted multiple patent applications as a result of this subpilot development. In October 2009, Phycal constructed the first pilot-scale skid-mounted Olexal and Heteroboost units for shakedown and preparation for pilot installation.

2. In June 2008, the company completed a preliminary design and executed a lease for a 30+ acre pilot site in Hawaii. This pilot will be capable of 100,000+ gallons of algal oil per year. As part of the pilot, the State of Hawaii has committed cost share. Collaboration was secured with potential customer and customer's customer.

3. In September 2009, the company delivered algal oil under an Air Force contract.

Future milestones:

1. Raise funds for pilot plant and operations in Hawaii with combination of federal and state awards and venture capital.

2. Construction, commissioning, and commencement of pilot plant operations in Hawaii.

3. Verify that pilot plant operating parameters meet cost model assumptions for $4/gal algal oil.

Business model:

Phycal will partially own and operate project-financed commercial algal oil production facilities. The company may also choose to license unit processes.

Fuel cost:

Target cost for first commercial facility in Hawaii is $4 per gallon of algal oil by 2016 with natural algae, without an operating subsidy, and including an adequate return to capital. Rollout of follow-on farms in contiguous U.S. will drive to $1-2 per gallon with transgenic algae and continuous improvement.

Competitive edge:

Phycal's primary differentiators and competitive edge are from the access and development of breakthrough technology and a culture of execution. Both the Olexal® non-destructive extraction technology and Heteroboost™ growth system fundamentally change the production of algal oil. See their value propositions in tables below. The tremendous advantages of Olexal and Heteroboost can only be realized if successfully executed. Phycal has built an execution culture based on the integration of scientists and engineers.

Working together provides broad perspectives where the biology and system-wide implications are understood so that knowledge is deployed quickly.

Table 1 - Value Proposition of Olexal

Direct Advantages	**Indirect Advantages**	**Commercial Advantages (*i.e.* How Olexal reduces CapEx and OpEx)**
The recycling of viable algae back to ponds after lipid milking to grow more lipids	• Decouples production of oil from production of biomass (*i.e.*, do not need to grow more biomass to grow more oil) • Energy, nutrients, and CO_2 go more directly to oil production instead of algal cell production • Allows continuous algal oil production instead of traditional batch processing which reduces inoculum and grow-up space and time • Oil extraction can begin in inoculum ponds thus converting into active area • Increases overall system efficiency and benefits energy balance	• Reduced nutrient supply chain and pumping of CO_2 • Reduced land requirement and greater percentage of land is active area
Eliminates or reduces dewatering	• Reduces system complexity • Reduced dewatering chemicals that must be handled up- and downstream	• Eliminates or reduces costs of an entire unit process
The removal of chemical algal growth inhibitors (*i.e.* algal waste)	• Algae cannot signal to each other that they are too "crowded" • Higher culture densities • Increased both biomass and lipid productivity.	• Higher return to capital for ponds • Reduced land requirement
The reduction or elimination of algal predators and competitors	• Dramatically reduces risk of culture crash • Extends open pond production for many weeks instead of a few days • Decreases amount of inoculum • Reduces both scheduled and unscheduled downtime • Increases Overall Equipment	• Reduced land requirement because of reduced inoculum • Higher return to capital for ponds

	Effectiveness (OEE)	
Extracts only non-polar lipids and not impurities (*e.g.* chlorophyll, gums, phospholipids)	• Higher quality product • Reduces purification burden	• Lower purification costs

Table 2 - Technical Value Proposition of Heteroboost™ Technology

Direct Advantages	Indirect Advantages	Commercial Advantages (*i.e.* How Heteroboost reduces CapEx and OpEx)
The use of phototrophically grown biomass as a feedstock to rapidly produce additional lipid and biomass heterotrophically	• Decouples production of oil from phototrophic production of biomass (*i.e.*, do not need to grow more biomass to grow more oil) • Fixed carbon provided goes more directly to oil production instead of algal cell production • Increased both biomass and lipid productivity • Increases overall system efficiency and benefits energy balance	• Reduced land requirement and greater percentage of land is active area • Increased oil production from fixed set of biomass
Modify the lipid profile of the algal strain by metabolism shift	• Algae appear to use different metabolic pathways for lipid production under heterotrophic growth allowing selection of different lipid end products • Different carbon sources provide different end products	• Higher value lipid product of better product specifications for customer satisfaction • Flexibility in the production system to tailor end products to customer use
Ability to use fixed carbon from inexpensive sources such as lignocellulosic industry	• Take advantage of the rapidly developing lignocellulosic industry as it develops sugars targeted to ethanol production • Offer an alternative fuel for producers of lignocellulosic derived sugars to ethanol that is more energy dense (and a direct drop in for current fuels). • Potentially provide more bang for the buck from lignocellulosic sugars as they are shuttled *via* respiratory metabolism to useful end products (*vs.* fermentative pathways for	• Lower cost fixed carbon sources • Provide flexibility to lignocellulosic sugar producers.

	ethanol).	

Stage:

Currently at subpilot. Pilot will be operational in 2010 at 100,000+ gallons of algal oil per year.

Website URL.

www.phycal.com

Piedmont Biofuels

Based in: 220 Lorax Lane, PO Box 661, Pittsboro, NC 27312
Year Founded: Cooperative division founded in 2002, Industrial division in 2005

Technology:
Esterification, Transesterication, Flash Evaporation, Acidification, Enzymatic refining

Fuel type:
Sustainable Biodiesel, Acid Oil, Fatty Acid Distillates, and Refined Glycerol

Major investors:
Privately funded.

Past milestones:
1. Awarded a $197,000 grant from the North Carolina Biofuels Center to conduct enzymatic biodiesel production. The research is a collaborative effort with Novozymes and Chatham County Economic Development Corporation (CEDC).
2. Commissioned the first biorefinery in North Carolina and therefore expanding biobased product refining capabilities. Part of the Biorefinery installation included the development of biobased fuel application for on-site boiler heat.
3. The first and only small commercial producer to receive BQ-9000 accreditation by the National Biodiesel Accreditation Commission in United States. Currently Piedmont Biofuels continues to be the only BQ-9000 accredited producer in the state of North Carolina.

Future milestones:
1. Operate Pilot-scale enzymatic biodiesel production on low value feedstocks like brown and trap greases
2. Combined Heat Power application utilizing biomass based diesel integrated into biodiesel production and the local utility grid.
3. Utility-scale bioheat installation for small town application across the US

Business model:
LLC partnered with a membership distribution cooperative for retail fueling.

Fuel cost:
Retail and wholesale capabilities

Competitive edge:
Piedmont's industry strengths are linked to its commitment to fuel quality, customer service and education. We have been educating public and private sectors about biodiesel since our cooperative formation in 2002. We are a leading institution for experiential education in the biodiesel industry. As the only BQ-9000 producer in North Carolina,

Piedmont is the only local provider that can fuel many government and municipal fleets with biodiesel with our high quality biodiesel. We also have a unique model of integration with all facets of feedstock collection, commercial production, a co-located biorefinery for co-products, retail and wholesale distribution capabilities, on-site analytical laboratory, engineering, and fabrication services.

Plankton Power

Based in:
395 Kendrick Avenue, Wellfleet, MA 02667

Year Founded:
2007

Annual Revenues:
N/D

Technology:
Integrated Algae Biorefinery/Transesterification for biodiesel step

Fuel type:
Biodiesel, Jet Fuel, Helicopter Fuel

Major investors:
Private Equity

Past milestones:
Confirmed Project Location at Massachusetts Military Reservation (10 Acre Pilot) integrated with Landfill gas recovery, Formation of World Class Project team with Woods Hole Oceanographic Institution, Marine Biological Laboratory, Cape Cod Commission & Regional Technology Development Corporation for $20 million DOE FOA; Production demonstration of 1 million gallons per year per acre in Argentina (3 month field trial results).

Future milestones:
Completion of 5 Acre Pilot facility, producing 1 million gallons per year; initial commercial facility development with gulf coast refinery and initial pilot location scale-up to 100 acres and 100 million gallons per year production

Business model:
Build, Own, Operate under joint ventures

Fuel cost:
$1.40 - $2.00/gallon (commercial scale projection)

Competitive edge:
Comparisons with DOE Aquatic Species Program open pond production levels of 2,000-4,000 gallons per acre per year:

1. Closed Pond – 5 times improvement lack of predators, virus, bacteria, impacts of rain and snow

2. Integrated Proprietary Technology – Combined pond and photobioreactor 6 days growth in one day
3. Oil Trigger Mechanism – Gellification/Stress Cycle (2-3x improvement natural = 20-35% à 50%-65%)
4. Normalize for Pond Volume – Normal pond is 1 foot, we have a 5x improvement with a nearly 5 foot depth and full exposure of volume to light
5. Temperature – Constant temperature control 5-10x improvement
6. Light – Constant light & proper wavelengths 5-10x improvement
7. Species selection – 3-5x improvement over local wild strains, fresh water and or warm water species
8. Nutrients – Specialized micronutrient profile, algae recycling, etc.1-2x improvement
9. Concentrated CO2 – use of concentrated CO2 compared with natural CO2 10x improvement
10. Salinity – Proprietary salinity level unknown major advance
11. Major new low energy dewatering and extraction system

Alliances and Partnerships:
Distribution is through existing channels and with more available demand than supply and includes 3 of New England's largest biodiesel distributors. Marketing, research and production partnerships are listed above.

Development stage
The technology is commercial ready. Platform is being migrated to the US for initial validation on a long production run, before moving to commercial fundraising and construction.

Website URL
www.planktonpower.com

Price BIOstock

Address: Monticello, AR
Year Founded: 1965 for The Price Companies, Inc., the parent company. 2006 for the Price BIOstock, Inc. division.

Business Model:
Wood and the black liquor that is a residue of the paper/pulp making process are biofuels. Over 60% of the electricity needed to power the mills come from these residues. Heat and steam are byproducts of wood combustion and gasification. The Price Companies is one of the largest and most experienced wood processing companies in the U.S. with 20 facilities nationwide under contract for many of the most respected paper/pulp mills in America (including International Paper, Rayonier, Weyerhaeuser, New Page, and Georgia Pacific). Price BIOstock is their division focused on supplying biomass feedstock for the emerging bioenergy industry. Typically, Price capitalizes, builds, and operates the preparation facility while the customer pays a price per ton for the fully prepared feedstock.

Type of technology:
Customized biomass feedstock aggregation, transport, and preparation (usually wood chipping) for use by any biorefinery or biopower plant.

Fuel Type:
Current production of over 14.5 million tons of wood chips for conversion to pulp, paper, and black liquor used to fuel power production in 2008. Production of over 2.5 million tons of hog fuel for combustion. New uses for wood chips include co-firing and combustion to generate biopower to meet RPS and RES standards; thermochemical or biochemical conversion to biofuels to meet RFS standards. Future uses for biomass pellets include torrefaction for drop-in replacement for coal.

Past milestones:
1. Secured contract for feedstock aggregation and receiving yard design and construction for Range Fuels, Inc. (ranked #5 in 2008) wood-to-ethanol biorefinery in Soperton, GA.
2. Signed a strategic alliance with Raven Biofuels (#26 in 2008) for building a chipping facility in British Columbia using bug-infested wood for feedstock to produce ethanol.
3. Signed a MOU with Zeachem (#11 in 2008) for supplying wood chips for their first demonstration facilities.

Future milestones:
1. Complete the construction and commissioning of the receiving yard and feedstock preparation facility for Range Fuels, Inc. project.
2. Help site and complete contracts for several biofuels and biopower projects in the

Southeastern U.S.

3. Consult and complete contracts with wood plantation and energy crop producers for supply of biomass for bioenergy production.

Fuel cost:
Price of biomass varies per location, feedstock specification, and annual volume requirements. Prices are indexed to agreed to indicators to protect all parties from fluctuations in feedstock prices.

Competitive edge(s):
Strong relationships with timberland owners and forest products community. Strong network of foresters and equipment suppliers. Existing relationships with major producers of wood residues. Time-tested systems for technology, IT, payroll, insurance, and employee training. Demonstrable management experience in all phases of biomass aggregation and preparation.

Price BIOstock quotable quotes:

- "Producing billions of gallons of ethanol will require millions of tons of cellulosic feedstocks. Moving that feedstock efficiently, safely and with as little impact on infrastructure and the environment as possible will be a major challenge in the years ahead." Biomass Magazine article on Price BIOstock 4/2008
- "Let me get this straight. You procure and prepare the feedstock so... we don't have to?" - prospect's summary of a closing argument.
- "[We have] a business relationship with most chip handling and wood processing companies in the USA. The Price Companies has exceeded all our expectations from customer service to chip quality on the chip pile. We look forward to the strengthening of our win-win relationship in the future." - testimonial from a satisfied paper/pulp mill customer.
- "Acquiring biomass is labor intensive and it involves building solid business relationships with landowners." enerG article on Price BIOstock 5/2009
- "The Price Companies have a better understanding of the customer/supplier relationship than anyone I've ever worked with. They are always able to match their production to [our] needs." - testimonial from another satisfied paper/pulp mill customer.
- "Biomass supply made simple." - Price BIOstock company slogan.

Website URL: http://www.pricebiostock.com

Primafuel

Based in:
California

Business:

Primafuel is active in globally strategic markets in the US, Europe and Asia. As part of its drive toward zero-carbon fuels, Primafuel's infrastructure projects have earned accolades and awards from leading authorities such as the California Air Resources Board. The company owns patent-pending technologies that improve the biofuels production process including waste-stream recycling, scalable and modular refineries, carbon-tracking infrastructure and the use of next-generation feedstocks.

Model:
Service provider.

Past milestones:

In 2008, Primafuel received a World Economic Forum "Technology Pioneer Award" for innovation in biofuels production and distribution infrastructure.

Primafuel announced last spring the creation of a new biofuels technology solutions subsidiary, Primafuel Solutions. The team's initial offering is SMAART™Oil, a down-stream system that extracts more food and fuel from the same bushel of corn. "Many advanced biofuels technologies have applications right now, with first-generation biofuels," said Rahul Iyer, co-founder of the company. "For example, we have a proprietary pretreatment technology that improves the efficiency of the corn oil extraction process, and an extensive portfolio of IP that will allow us to target more food-grade and fuel-grade materials, as well as other higher value compounds," he said. "The days of having just two products, ethanol and DDGs, are over."

The Primafuel systems are tailored to each client's facility, and corn oil extraction rates will vary from facility to facility. Primafuel evaluates a range of samples (free of charge) from the client's plant, and extraction rates and performance guarantees are based on these tests Like companies such asGreenShift, the basic corn oil extraction technology involves a centrifuge process to separate the oils from the corn silage. Companies are differentiating themselves by packaging finance and post-production marketing services for ethanol clients in a tough balance sheet environment; Primafuel's focus on using advanced technology to customize a range of high-value compounds gives it a further point of differentiation.

Future milestones:

In 2009, Primafuel announced that it would enter the algae production sector with a licensing agreement with Ben-Gurion University Microalgae Biotechnology Lab in Israel.

The company's biorefinery technology team had previously been recognized as a Technology Pioneer by the World Economic Forum for transformational biomass processing technologies. Primafuel execs said that the company would combine upstream algae production and downstream biorefinery systems.

Propel Fuels

Based in:
California

Business:
Biofuel retailer.

Model:
Owner-operator.

Past milestones:

Launched an improved version of its CleanDrive personal and fleet carbon emission reduction tracking platform. The application supports users tracking emissions benefits from biofuels usage for personal reasons, as well as those tracking emissions benefits for governmental reporting efforts, such as compliance with California's 2020 Targets. The application also supports the future monetization of emissions reductions in carbon trading markets. The technology includes a widget that can be added to a company website or MySpace page.

Hired Matt Horton, principal of venture capitalist @Ventures, as CEO of the company, replacing Rob Elam who will remain as President. Propel has E-85 ethanol and B-5 biodiesel pumps at five gas stations in Sacramento, Rocklin, Citrus Heights and Elk Grove. It also has biofuels pumps at six stations in Washington.

Future milestones:

In 2009, new Propel Biofuels CEO Matt Horton confirmed that the company intends to build as many as 500 renewable fuel stations throughout the state of California. The company recently relocated to California from Seattle and opened five biofuels stations in the Sacramento area.

Propel Fuels intends to do so by striking up a partnership with Enterprise Rent-A-Car to fuel Enterprise's rental cars in the Sacramento area with renewable E85 Flex Fuel. Enterprise has 73,000 flex-fuel vehicles nationally. Twelve Sacramento Enterprise locations have been selected to participate in the pilot program served by Propel's five Clean Fuel Points in the Sacramento area that serve E85 as well as biodiesel. Clean Fuel Points accept major credit and fleet cards and are open 24/7 offering convenience to Enterprise customers.

Pure Vision Technology

Based in:
511 McKinley Avenue, Fort Lupton, CO 80621

Year Founded:
1992

Annual Revenues:
2009 - $250k (Projected), 2008 - $309k, 2007 - $780k

Technology:
Front-end Biomass Fractionation for production of inexpensive sugars for the biofuels fermentation industry

Fuel type:
Extract separate sugars and lignin streams from biomass for downstream conversion to cellulosic ethanol, butanol, next-generation drop-in biofuels or biochemicals

Major investors:
Officers, Friends & Family -- currently preparing for round A financing

Past milestones:
First sale of equipment, Formation of spin-off companies for marketing PureVision technology, Purchase and operation of pilot Fractionator at 0.5-ton/day

Future milestones:
Round A financing, Integrated demonstration at 20-ton/day, Design of commercial-scale plant at 250-ton/day

Business model:
Equipment and process sales, licensing and sublicensing fees, and royalty licensing per thousand dry tonnes of biomass fractionated

Fuel cost:
Commercial target of 10-cents per dry pound sugar. Projected impact on downstream cost of biofuels is a 10-20% reduction per gallon, with an expansion in feedstocks to all cellulosic material.

Competitive edge:
PureVision Biomass Fractionation Process effectively and efficiently separates lignocellulosics biomass into useful intermediate components including cellulose fiber, xylose-rich syrup, lignin and biogrowth media. The high purity, high yeild cellulose fiber is

available for pulp applications or efficient hydrolysis to glucose. The energetically-dense glucose and xylose syrups can be converted, via thermochemical or biocatalytic routes, to ethanol, butanol, and many other chemicals. The sulfur-free, highly-depolymerized, energetically-dense lignin can be converted to biofuels or used directly as boiler fuel. The low-toxicity extractives-rich liquor is a suitable biogrowth media to produce yeast feed protein or for biocatalyst propagation. The flexibility of the front-end PureVision Biomass Fractionation Process to produce diverse fractionated product streams provides a hedge against the volatile fuel market; and allows for future technological upgrades to higher-value fuels and chemicals.

Alliances and Partnerships:
Century Extrusion is a strategic manufacturing partner with the ability to rapidly build and ship finished units worldwide. ICM has filed for a DOE grant with PureVision as a sub-contractor to provide front end fractionation for a pilot plant. An agreement is in place regardless of grants to co-locate a PureVision Fractionator at their facility in St. Joseph, Missouri. Gevo has also filed for a DOE grant with PureVision to provide commercial demonstration of an integrated biorefinery with cellulosic feedstock. Microbiogen Pty Ltd. is the world's leading non-GMO yeast developer and has an agreement with PureVision to co-develop an integrated process for maximizing yields from the PureVision process for multiple cellulosic feedstocks. Numerous other strategic partnerships are in process with technology companies, energy companies and foreign governments and companies to provide front end fractionation for cellulosic feedstocks.

Development stage:
Pilot, with a working 1/2-ton per day scale Fractionator producing data to be used in the design of a 20-ton per day scale Fractionator in 2010. A commercial-scale 250-ton per day Fractionator is scheduled for 2012, with first units shipped in that year.

Website:
www.purevisiontechnology.com

Raven Biofuels

Based in:
61 South Paramus Rd; Paramus, NJ 07652-1236

Year Founded:
2007

Annual Revenues:
Pre revenue

Technology:
Two stage dilute acid hydrolysis

Fuel type:
Ethanol, Furfural and high value organic specialty chemicals

Major investors:
Tribune Capital Partners, I2BF

Past milestones:
1. Technology: Advancement of technology with multiple process improvements, Complete Process Review by Leading, Global Engineering Firm, Technology Development to Commercial Stage.
2. Projects: Two sites under development in Mississippi and British Columbia
3. Joint Venture: Established Joint Venture in British Columbia

Future milestones:
Break Ground on First and Second Commercial (11MGY) Integrated Biorefinery, Complete Construction and Commence Operations of First Biorefinery.

Business model:
Owner/Operator.

Fuel cost:
This cost for ethanol and chemicals produced cannot easily be separated. It is the biorefinery model (total output of all products) especially furfural that makes the economics of Raven's business attractive.

Competitive edge:
True Biorefinery model- Multiple products of ethanol and furfural with high value furfural and other products adding increased profitability and market diversification, low cost

production, commercially ready technology, location/feedstock availability, and vertically integrated model

Alliances and Partnerships:
Kamloops Indian Band for fibre supply in BC, Larson Engineering (U.S.), Sandwell Engineering (Canada), Price Biostock (U.S.) for feedstock sourcing.

Development stage Commercially ready

Website: www.ravenbiofuels.com

Remediation Earth, Inc.

Address: 4607 Lakeview Canyon Rd, Suite # 438, Westlake Village, CA 91361

Year Founded: 2007

Type of technology:
Pyrolysis & anaerobic gasification

Fuel type:
Synthetic diesel, transportation grade “green” diesel, #2 fuel oil

Major investors:
Currently supported by private investors

Past milestones:

A) Signed the exclusive license agreement for all of North America with our Japanese technology partner
B) Secured our first long-term (20 year) material recovery facility (“MRF”) contract in San Bernardino, CA
C) Recently started lease on new 42,000 ft2 building for our new pyrolysis facility

Future milestones:

A) Have first commercially operating pyrolytic system that converts plastic and medical waste to fuel, which meets SCAQMD’s emission standards.
B) Complete the development of our Pyrolysis II anaerobic gasification system with integral Fischer Tropsch section.
C) Integrate our chemical-free and CA-EPA registered wastewater technology and our new power generation capabilities with our thermo-conversion technologies in a highly synergistic manner.

Business model:
Equipment sale, lease, build, own/operate (“BOO”)

Fuel cost:
Less than $1.00/gallon, using our current Pro Forma

Competitive edge:
Our pyrolysis process is proven commercial technology (over 15 years), and is enhanced using our patented real-time remote prognostic health monitoring (“PHM”) system. We address environmental issues with our ability to convert a wide variety of feedstocks into valuable energy products, including synthetic diesel, #2 fuel oil, transportation grade

biofuels, electricity, carbon black and bio char, and H2 gas from pyro-liquids. And the system emissions are well below EU and US limits. We have over 20 years experience using a ‘modular system’ approach.

Distribution, research, marketing or production partnerships or alliances:
Plants In A BoxTM joint venture; Inland Empire Environmental partnership

Stage:
Commercial, with ‘shovel-ready’ projects

Website URL:
www.RemediationEarth.com

Remfuel Bioenergy Private Limited

Based in: India

Business:
Conversion of Straight Vegetable Oils (SVO), including Algal Oils to Biodiesel blends WITHOUT the need for transesterification. Also a Novel non-food source for Biodiesel without the need for Transesterification is also ready for commercialization.

Model:
License technology(s) for commercial use; existing SVO plantations will benefit from reduction in capital costs.

Metrics:

REMB-1: A novel biodiesel source has been identified and the technology has been patented under PCT.
REMB-2: A new generation biodiesel additive (patent-filed), which results in completely eliminating the need for transesterification. Capital costs and process costs help bring down biodiesel blend costs by over 30%.
Both of these novel technologies improve fuel efficiency and significantly reduce emissions; have been validated and are ready for commercialization.

Year Founded:
2000

Annual Revenues:
Bigtec Labs
2007: US$ 2.2 million
2008: US$ 4.6 million
2009 (projected): US$ 6 million

Technology:
Our focus is on developing biofuel technologies, which eliminate transesterification for straight vegetable oil (SVO), animal fat oil and algal oil.

Our first technology (REMB-1) is based on a new biodiesel source, which generates multi-fold income to the farmer compared to traditional biodiesel sources like Jatropha and requires no transesterification. The cultivation of this tree also generates an exotic food for human consumption. Novelty of this technology invention is established by acceptance of all 38 claims by PCT as novel and patentable (PCT filed)

Our second technology (REMB-2) is a fuel additive, which makes SVO to work as a 'drop-in' bio-fuel to blend into diesel. This essentially eliminates the transesterification of fats, and allows any SVO, animal fat oil and algal oil to be used directly as a diesel blend. Our technology saves over 30% of manufacturing costs and an independent patent search report indicates that our technology is unique & patentable.

Both of our technologies have been independently evaluated on different diesel engines and the emission, combustion and performance of our biofuel blends are on par or better than commercially available diesels and biodiesels.

Fuel type:
1.Biodieselblend, no transesterification
2.Fuel additives that eliminate transesterification and make SVO, Animal Fats and Algal Oil into drop-in Biodiesel blends

7. Major investors
Funded by the parent company bigtec Holdings Private Limited

8. 3 top milestones for 2008-09
· Development of fuel additives which eliminate need for transesterification
· Blending agents for gasoline and algal fuel (no transesterification)
· New plant oils, which do not require transesterification

9. 3 major milestone goals for 2010-11
· Licensing/Commercialization of biofuel technologies, which eliminate transesterification
· Development of open-pond stable algal strain
· Converting plant biomass to biofuel

Business model:
Develop novel biofuel technologies, validate & license the technologies

11. *Fuel cost (per gallon)
REMB-1 - New biofuel blend: US $ 1.3/gallon
REMB-2 - Biodiesel fuel additive: US$ 1.5/ gallon

12. Competitive edge(s): (e.g. Distribution, economies of scale, low-cost, quality, location, vertically integrated model, location, yield, genetics)
· REMB-1 Unique plant-based fuel source, with no transesterification needs, which also generates food, and provides multi-fold farm income, compared to traditional biodiesel sources.
· REMB-2 Our fuel additive completely eliminates the need for transesterification of any traditionally used oils and cuts biodiesel production cost by over 30%.

13. Distribution, research, marketing or production partnerships or alliances
We have a dedicated R&D team focused on developing innovative technologies in biofuels

and are in the process of licensing/commercializing our technologies. We do not have any research partnerships and the research is exclusively the outcome of concerted in house R&D efforts.

Development stage

Independent research institutions have validated our new biofuel and biodiesel additive technologies and we are in the process of licensing/commercializing these technologies.

15. Website URL

www.remfuelbioenergy.com

www.bigteclabs.com

SEKAB

Based in:
P.O. Box 286 SE-891 26 Ornskoldsvik, Sweden

Year Founded:
1985

Annual turnover:
2009 € 0,19 billion, 2008 = € 0,22 billion, 2007 = € 0,19 billion.

Technology:
Development of a Cellulose to Ethanol process based on Enzymatic Cellulose Hydrolysis after dilute acid pre-treatment and fermentation of C5 and C6 sugars.

Fuel type:
Ethanol

Major investors:
Regional Energy Companies

Past milestones:
1. The commercial part of the company (Biofuels and Chemicals) developed and launched a system for the first Verified Sustainable Ethanol together with Brazilian ethanol producers and the first part owned grain based plant in Poland successfully started up in spring 2009 .
2. Glucose yields from cellulose comparable to best lab results have been reached in the pilot for two stage dilute acid hydrolysis and more than 60 % of theoretical glucose yield has so far been reached for enzymatic cellulose hydrolysis of soft wood.
3. In a trial during spring 2009 the plant was run for 21 consecutive days without interruption and pentose fermenting yeast was successfully produced at a close to theoretical yield within the EU-project NILE.

Future milestones:
1. The international commercial breakthrough for ethanol ED95 in modified diesel engines.
2. Secure finance for the development, preproject and precommercialisation phase of cellulose ethanol.
3. First contract for a commercial scale plant

Business model:
Technology provider in a consortium with licensing of protected technology and supplier of design package.

Fuel cost:
The estimated cost based on bagass in tropical countries integrated with sugar based ethanol production is USD 2 per gallon comparable to sugar based ethanol.

For softwood in Scandinavia with high feedstock cost it is, in an integrated plant with heat and power, about USD 3 per gallon comparable to agro-based production in the region.

Competitive edge:
SEKAB is one of the most experienced suppliers of ethanol based fuels with a broad portfolio of solutions from feedstock to vehicle, including how to meet standards and regulations, overcome barriers etc. Combined with the development of the cellulose based technology, the company is well prepared for the continued expansion and future challenges.

Alliances and Partnerships:
SEKAB has experience to build distribution network together with other stakeholders like oil companies. The network for development includes major heavy vehicles producers, flexifuel vehicle manufacturers in Europe, universities active in the field of cellulose ethanol, research enzyme companies for development and pilot evaluation of enzymes, equipment/reactor suppliers etc.

Development stage:
The technology is verified in the unique pilot plant operated on shift 7/24 since 2004, accumulated running time now exceeds 19 000 hours. Technology is ready to be scaled up to the first commercial ethanol plant integrated with sugarcane based ethanol and/or heat and power generation plant for soft wood.

Website:
www.sekab.com

Simply Green

Based in: New Hampshire

Business:
Simply Green Biofuels was founded in November 2006 with the intention of offering green alternatives to home heating, diesel and marine fuel throughout the Seacoast.

Model:
Biodiesel, ethanol and bioheat distributor.

Past milestones:
In 2008, Simply Green Biofuels announced that it would open a "congreenience store", plus a biodiesel station in Dover. The company said that the station would be the first in the state to exclusively pump biofuels. B99 biodiesel will be available on advance request.

In 2008, Simply Green Biofuels received the Maine Environmental Hero Award, which will be awarded at the Going Green Expo in Saco. The award was given in recognition of a bailout of 75 customers stranded in mid-winter without oil heat when conventional oil companies Veilleux Oil, Price Rite and Perron Fuels all went out of business.

Future milestones:
In 2009, Simply Green Biofuels will expand into Northern New Hampshire by opening a distribution center adjacent to the Clean Power Development facility to be built in Berlin. Start up burners within the facility, on-site equipment and back up building heat are applications for Simply Green's BioHeat and BioDiesel.

According to Andrew Kellar, Founder of Simply Green, "Our vision is to encourage loggers to replace traditional diesel used throughout the process- from the initial harvest to the transportation of wood to the facility, in order to have a truly environmentally friendly life cycle."

Metrics:
The SG station features B5 and B20 biodiesel, and E10 ethanol, while 75 percent of the products sold in the convenience store will be sourced within a 100-mile radius of Dover.

Simply Green's is made from Waste Vegetable Oil (WVO). Blends are available from 5% up to 100% pure Biofuel. No system modifications are needed to run up to a 20% (B20) blend.

Website:
www.seacoastbiofuels.com

Sriya Innovations

Based in: 1831 West Oak Parkway, Suite B Marietta, GA 30062

Year Founded: 2003

Annual Revenues:
N/A

Technology:
NanoCatalyticSolvoThermal (NCST)

Fuel type:

- Low cost C5 and C6 sugars for cellulosic ethanol and other advanced biofuels production
- Biochemicals including biomass derived ethylene glycol, furfural and low molecular weight lignin (current)
- Next generation of products currently under development include phenols, vanillin, xylitol and terephthalic acid

Major investors:
Kleiner Perkins: $22M invested in Series A and B

Past milestones:

1. Proved NCST platform at bench scale
2. Proved NCST platform at pilot scale: 100 kg/d (dry basis)
3. Designed and built process development unit (PDU) and confirmed process at 3 tonnes/d (dry basis)

Future milestones:

1. Develop engineering scale data at PDU scale, confirm process economics, and establish product markets/customers
2. Design and build demonstration scale plant: 80 tonnes/d (dry basis)
3. Design and bring commercial plant online: 320 tonnes/d (dry basis)

Business model:
Licensing for liquid transportation fuels, Owner/operator for value added chemicals

Fuel cost:
Sriya can produce sugars for <$1/gallon on equivalent ethanol basis. These sugars have been tested by leading universities and ethanol providers who have concluded they ferment quickly with no inhibition problems.

Competitive edge:

- Reaction time in seconds: Six (6) orders of magnitude faster than enzymatic process
- Flexible feedstock inputs: Sriya technology is biomass agnostic and works for corn stover, corn cobs, wheat straw, rice straw, soft and hardwoods
- "Dial a Product": Tunable to produce both high volume fuels and high value chemicals like sugars, ethanol, MEG, vanillin, xylitol, furfural, HMF, phenolics
- No Consumables: Does not use acids, bases, enzymes or external solvents
- Economical: On a distributed products basis, sugars can be produced for as little as $.04/lb on an operating basis. Extremely fast reaction times (seconds/minutes for biomass deconstruction and cellulose hydrolysis) enable very low capital expenses.
- Fast fermentation times: Our crude sugars ferment quickly without inhibition problems using current commercial conditions
- Lignin to phenols & vanillin: Converts low value lignin into high value bio-products

Development stage:
Pilot facility opened early November 2009; Demonstration facility planned for late 2010; Commercial for 2011

Website URL:
www.sriyanova.com

SRS Engineering Corporation

Based in: 25843 Jefferson Avenue. Murrieta, CA 92562

Year Founded: 1985

Annual Revenues:

2009 - $20M (projected)
2008 – $5,554,590.00
2007 - $4,393,749.00

Technology:

- Transesterification
- Glycerin Purification
- High FFA Pretreatment
- Biodiesel Distillation
- Methanol Recovery
- Biodiesel Washing
- Turnkey Biodiesel Plants

Fuel type:
Biodiesel

Major investors:
The owners

Past milestones:

- SRS received 4 contracts to engineer and manufacture biodiesel plants.
- Starting up two biodiesel plants simultaneously
- Expanded our manufacturing facility and our capabilities in the United States and in India.

Future milestones:

- SRS plans to expand its research and development in the field of biodiesel
- Explore next generation fuels including renewable diesel
- Market our glycerin purification systems to the existing biodiesel plants to increase their profits.

Business model:
Corporation

Competitive edge:

SRS Engineering is uniquely positioned to handle its small and large projects with the same level of detail. Our biodiesel plants have the lowest energy consumption and because of the fact that we employ the best automation technologies available, our plants require minimal human intervention thus reducing overhead and the customer's bottom line. Our company has an extensive engineering background backed up by Fortune 500 companies and recognizable companies worldwide.

Alliances and Partnerships:
SRS is expanding its marketing efforts to Argentina and other South American countries with possible partnerships on the horizon

Website:
www.srsbiodiesel.com

St. 1 Biofuels Oy

Based in:

Purotie 1, 00380 Helsinki, Finland

Year Founded:

2006

Annual Revenues:

2009: 10 m€

Technology:

Continuous fermentation

Fuel type:

Ethanol

Major investors:

Subsidiary of Finnish privately owned energy company St1 Oy

Past milestones:

Building and opening four new plants utilizing different food industry waste and sidestreams. Feedstock is from local bakeries, potato processing plant, sweet manufacturing and brewery. Also old dated bread waste form markets are utilized after mechanical package removal.

Opening of Dehydration plant in Hamina Finland in June 2008. Dehydration plant completes the dispersed ethanol production concept.

Launching of RE85, the first domestic high blend ethanol biofuel in Finland in April 2009

Development of Bionolix plant type. BionolixTM plant uses household biowaste and commercial biowaste as feedstock.

Future milestones:

Building and Opening of the first BionolixTM plant in Hämeenlinna, Finland.

Developing and building second generation cellulosic ethanol pilot plant.

Business model:

Own ethanol production in home markets: Finland, Sweden, Poland and Norway. Licensing technology, partnerships in other countries.

Fuel cost:

Production cost $1,90 / gal

Competitive edge:

Waste feedstock, Dispersed production, Energy efficiency

While producing sustainable bioethanol, Etanolix® technology also provides a sustainable waste management system and reduces the total amount of waste.

Local fuel production increases country's energy independence and decreases the need for imported fossil fuels. This combined to better utilization of waste makes the Etanolix® technology unique in terms of CO_2 balance and ecology. The concept has positive impact also on employment through production plants and Refuel RE85 distribution. Waste to Ethanol is a considerable tool when trying to reach EU's waste and biofuel directives.

The concept is easily adaptable to countries around the world. Waste that is used as feedstock in the technology is available everywhere as is the need for successful waste management solutions. This combined to the global need for renewable energy ensures the potential in the market for this product.

Alliances and Partnerships:

St1 Oy has 650 petrol stations in Finland, Sweden, Norway and Poland. This station network can be used for distribution and marketing.

Technology research partner has been VTT, The Finnish Research Centre of Finland.

Development stage

Commercial

Website:
www.st1.eu

Storm Fisher Biogas

Based in:

Ontario, Canada

Business:

Biomethane, converted to grid-connected electricity, via anaerobic digestion.

Model:

Build, own, operate

Past milestones:

1. Have 5 projects; over 20 MW in late stage development with construction starting in 2009.

2. Built a pipeline of 37 MW of new projects?3. Raised significant private equity financing

Future milestones:

1. All 5 late-stage projects operational or in construction

3. Post-revenue in 2010

Metrics: Diverting organic by-products from landfills and land application reduces methane emissions by a factor of tendeep fryer oil can generate about 60 times as much biogas as cow manure for any given quantity.

StormFisher quotable quotes:

"Competitive edge is integration of existing technologies with a focus on commercial contracts."

"Our experience with producers of organic by-products is that disposal can be a significant cost centre, with tipping and transportation fees ranging in many cases above $100 per tonne. Under agreements with us, companies can often reduce these costs as these by-products are beneficially used rather than dumped, and our plants are being built in or near major food processing clusters."

Sustainable Power

Based in: Texas

Business:

Renewable fuel and power producer, based on Rivera process.

Model:
Owner-operator, partner, licensor.

Past milestones:

Sustainable Power announced that in a three-month test conducted in the Dominican Republic, a Ford F350 hydrogen on demand system averaged of 40 miles per gallon, compared to a previous 8 mpg average with conventional fuels. Sustainable Power produces power and hydrogen as outputs from its biomass-based thermochemical conversion process.

Completed an initial shipmentof its computer controlled "hydrogen on demand" Emissions Remediation Systems (ERS). The ERS produces hydrogen-on-demand from a mixture of water and a proprietary catalyst. The first ten units of an order for several hundred units has been shipped to the Dominican Republic for use on engines for power generation. Sustainable Power will share in the energy savings generated by the units. Partnered with Sustainable Produce to acquire Angel Eyes Produce of Massena, NY. Sustainable Power will produce electricity from biomass to power Angel Eyes Produce's Terraponics technology that grows fresh produce in "Super Grow Buildings," that utilize hydroponic and hydroculture technologies, and achieve a higher productivity than outdoor growing.

Future milestones:
Third-party validation of company data on yield.

Metrics:
The company said that it believes its technology can increase fuel economy in electrical generators by 30 percent.

SynGest

Company description:
Advanced Bioproducts and Biofuels made from biomass

Address:
310 Green St, San Francisco, CA 94133

Year Founded: 2008

Chief Executive Officer:
Jack Oswald

Annual Revenues: N/A

Major Investors:
Funded by founding team.

Type of Technology(ies) : Gasification of biomass, vegetable oil extraction

Feedstocks:
All cellulosic feedstocks

Fuel Type:
Anhydrous ammonia and Urea. Methanol, DME, biopolymer precursors such as propylene and ethylene.

Fuel Cost (if applicable - per US gallon):
SynGest has negotiated terms to secure long term feedstock supplies at $35/T. At these prices we can produce NH_3 at $325/T (cash flow BE price), and methanol for $1/gal.

Offtake partners (if applicable):
TBA

Co-products (if applicable):
Biochar

3 Top Milestones for 2009-10:
Selected initial site for first commercial scale deployment and completed pre-construction zoning, permitting, etc. in Menlo, IA. Completed initial funding for pre-construction engineering and completed contracts with EPC team. Completed long term offtake and feedstock agreements.

3 Major Milestone Goals for 2011-13:

Complete Front End Engineering and Design (FEED) for first commercial scale demonstration plant. Reach project financial close and begin construction. Enter into initial full scale production.

Business Model:
Owner-operator as well as technology licensor.

Competitive Edge(s):
Protected IP in the area of syngas produced from biomass. The core technology focuses on solving the so-called "gas cleanup" problem by the implementation of two different types of unit operations that each produce syngas. Stage 1 is an oxyblown biomass gasifier designed specifically for near-single-step conversion of biomass into syngas (CO and H2). Stage 2 is an oxyblown catalytic autothermal reformer that produces syngas by completely reforming the intermediates produced in stage 1 which are (a) tars, (b) volatiles such as BTX and (c) methane. The result is the highest possible syngas yield at the lowest possible capital and operating cost and dramatically simpler operating simplicity and efficiency.

Distribution, Research, Marketing or Production Partnerships or Alliances.
Distribution is primarily through farming coops.
R&D is done mainly in-house or in collaboration with key partners such as Alion Science.
SynGest Inc. has very good collaborative relationship with Iowa State University and specifically with Dr. Robert Brown.
SynGest is working closely with Mark DePoy, Southern Iowa Coordinator for Natural Resources Conservation Service, USDA and Dr. Emily Heaton, Assistant Professor of Agronomy at Iowa State University, to establish biomass crops such as miscanthus on marginal ground in Southwest Iowa. This effort would increase income in rural communities, provide new jobs, help protect our soil and natural resources and provide an excellent feedstock for SynGest plants as well as other biofuel facilities.

Stage (Bench, pilot, demonstration, commercial): Planning for construction of first commercial scale demonstration project.

Website URL www.SynGest.com

Targeted Growth

Based in: 2815 Eastlake Avenue East, Suite 300, Seattle, WA 98102
Year Founded: 1998
Annual Revenues: Targeted Growth does not disclose revenue

Technology: Targeted Growth is a bioscience company, developing technologies that both increase seed size and yield in major crops. It has also developed a line of dedicated energy crops, including camelina and sugarcorn, as well as a non-agricultural feedstock – cyanobacteria algae for biomass.

Fuel type: Targeted Growth products can be used for ethanol, biodiesel, and biojet.

Major investors: Alliance Bernstein, Capricorn Investment Group, GrowthWorks, Skoll Foundation and Victoria Park Capital.

Past milestones:

Targeted Growth has made significant strides in the past two years in developing dedicated, non-food crop plants for use in biofuels.

1. In January 2009 Targeted Growth provided camelina that powered a Japan Airlines test flight of a Boeing 747-300 aircraft. The test flight, which took place in Tokyo, Japan, was powered by biojet fuel derived from camelina (84%), jatropha (under 16%) and algae (under 1%) oil, refined by UOP Honeywell. The results of the flight conclusively confirmed the second-generation biofuel's operational performance capabilities and potential commercial viability.

2. In July 2009 Targeted Growth announced it has developed a way to increase the lipid content of blue-green algae (cyanobacteria) by approximately 400 percent. This discovery dramatically increases the oil yield per acre, decreases the cost of algae production and helps algae-based biofuels become price-competitive with petroleum.

3. In early August 2009 Targeted Growth provided camelina used to power the Boeing U-787 unlimited hydroplane at the annual Chevrolet Cup at Seattle's Seafair weekend. The U-787 boat became the world's first to be powered by 100 percent sustainable biofuel and ran the fastest qualifying lap of the weekend at 153.6 miles per hour, six seconds faster than the previous year's run on petroleum-based fuel.

9. 3 major milestone goals for 2010-11 In 2010-11, the company will continue to advance its algae program as well as expand acreage of camelina across the United States.

Business model:
Targeted Growth has a diversified approach to generating revenue. Including partnership,ks commercial product development and commercial licensing.

Fuel cost:
N/A

Competitive edge:
Strong Science & Partnerships: Targeted Growth has been researching and developing dedicated energy crops for more than 10 years. Founded in 1999, the company has a history of strong science and has strategic partnerships with leading researchers and agribusinesses around the world. The combination of sound science and strong partnerships allows the company to continue to develop technologies that both increase seed size and yield in energy crops.

Alliances and Partnerships:
Targeted Growth maintains a joint venture with Green Earth Fuels, a vertically integrated biodiesel energy company, creating the company Sustainable Oils, Inc. Sustainable Oils is a producer and marketer of renewable, environmentally clean, and high value bio- based biofuels.

Development stage: Targeted Growth is a decade-old bioscience company that derives revenue from commercial sales, partnerships and licensing.

Website URL:
www.targetedgrowth.com

Taurus Energy

Based in:
SE 22370 LUND SWEDEN

Founded:
Feb 2007

Revenues:
Pre-revenue

Technology type:
Fermentation of pentoses for ethanol production

Fuel type:
Ethanol

Past milestones:

Agreement with the Technical University of Lund , the Technical University Chalmers and SEKAB to run a project supported by the Swedish state Energimyndigheten The project has the title Industrial verification of fermentation of pentoses

MoU with an Indian company and also a NDA with an ethanol producer

To have 3 licensing agreements in place with major ethanol producers

Future milestones:

To offer our fermentation technology of pentoses for ethanol production to potential ethanol producers both old and new Our technology can be used in both existing ethanol plants and new plants Our patent portfolio consists of 13 patents of which 12 are direct tied to fermentation technology of pentoses One patent is a production patent to be used in an SSF process (Simultaneous Saccharification and Fermentation) resulting in a leaner and less investment intensive process

Metrics: Taurus is listed on the Swedish stock exchange Aktietorget. 60 % of the shares are owned by a company by name Forskarpatent AB .Forskarpatent is owned by Swedish institutions and Universities the rest or 40 % of the shares are privately owned

Web URL:
taurusenergy.eu

ThermoChem Recovery International (TRI)

Based in: 3700 Koppers Street, Suite 405, Baltimore, MD, 21227

Year Founded: 1996

Technology::

Steam reforming gasification

Fuel type:

TRI's high-quality, medium-BTU syngas can be converted into a wide range of downstream biofuel and biochemical products. Since 2003, a TRI gasifier has been in commercial-scale operation at Norampac's Trenton (Ontario) containerboard mill, gasifying black liquor (solid biomass equivalent: 500 dry tons per day). Currently, TRI is the gasification technology provider for two separate DOE-funded biorefinery projects which will convert TRI syngas to Fischer-Tropsch waxes and diesel for market sale, and provide tailgas to offset natural gas use in the lime kiln. One of these projects, NewPage Corporation, converts 500 dry tons per day of woody biomass feedstock, and the other, Flambeau River BioFuels, converts 1,000 dry tons per day. Both are integrated with existing paper mills and benefit from tight thermal integration of the biorefinery and host facility, utilizing tail gas, steam and hot water streams for maximum economic advantage.

Major investors: The Abell Foundation, Inc., a leading Maryland foundation established in 1953, which makes investments in breakthrough clean energy technology companies based in Maryland.

Past milestones:

- Award of NewPage Corporation's DOE Biorefinery grant, with TRI as main technology provider
- Award of Flambeau River BioFuels DOE Biorefinery grant, with TRI as main technology provider
- Successful launch of state-of-the-art proprietary 4 dry ton per day Process Demonstration Unit (PDU) in Durham, North Carolina

Future milestones:

- Ground-breaking on NewPage project
- Ground-breaking on Flambeau River BioFuels project
- Project close on RDF-to-fuels project

Business model: TRI licenses its proprietary gasification technology and provides specialized equipment and engineering services to integrate biorefineries with energy hosts like pulp and paper mills.

Fuel cost:

This varies by feedstock, size and configuration of plant, ability to fully utilize and monetize energy by-products (tail gas, steam, hot water, etc.) and type of end products, but TRI has very competitive operational costs across a range of different project/product scenarios.

Competitive edge:

TRI's main competitive advantages come from three key attributes of its proprietary technology: 1.) an ability to successfully gasify a wide range of feedstocks (woody biomass, agricultural residues, Refuse Derived Fuel, lignite, subbituminous coal, etc.) into a consistent and reliable medium-calorific (300-350 BTU/dscf) syngas; 2.) a proven ability to "dial in" the ideal hydrogen to carbon monoxide (H_2:CO) ratio required by the specific downstream GTL conversion process; and 3.) a highly-scalable steam reformer vessel design such that project sizes from 500 – 2,000 dry tons per day can be accommodated by a single gasification system. TRI can handle a wide range of different feedstocks coming in, and can reliably supply syngas capable of producing a wide range of different energy products.

Alliances and Partnerships:

TRI has established research, marketing and technology partnerships across a wide range of entities and resources to most widely commercialize our proprietary technologies. We treat these relationships as business confidential until specific project-related announcements can be made.

Development stage:

TRI has been commercial on black liquor, a liquid biomass, since 2003 and is currently at demo scale on solid biomass, entering into commercial scale.

Website:
www.tri-inc.net

TMO Renewables

Based in: UK

Business: Licensor of a cellulosic microbe that produces up to 15 percent more ethanol than traditional fermentation technology, and reduces energy inputs in the fermentation and distillation process.

Model: Licensing, including a royalty on production of additional gallons of ethanol ("the TMO gallons").

Investors include: Jupiter Asset Management, Noble Group, RAB Capital, Presnow Limited, Diverso Management, Libra Advisors

Past milestones:

1. Development of a secure, scalable application of technology, following the scientific breakthrough of discovering the microbe.

2. Commissioning of the company's demonstration plant in Surrey, UK, used for customer demonstrations and feedstock testing.

3. Raising $18 million in 2009's nefarious capital markets, funds that will be used to take TMO's technology to the US.

Future milestones:

1. TMO is now in the commercialization phase, with "customer, customer, customer" as the focus. Numerous collaborations with ethanol project owners and developers will need to be converted into commercial customer relationships. Look for TMO to secure its first customer this year.

2. Look also for an independent report this year confirming that with use of TMO Renewables technology, starch gallons can qualify as advanced biofuels under the terms of the Renewable Fuel Standard based on direct GHG emissions.

3. Look for increased feedstock flexibility.

Metrics:

TMO's system costs $47-$60 million to implement, although payback comes within three years according to CEO Hamish Curran. The investment will provide up to 15 Mgy in additional fuel production at a traditional 100 Mgy ethanol plant.

Hamish Curran (CEO) quotable quotes: "Here in the UK, after what was known as the Gallagher Review, the government reversed the biofuels mandate on the basis of the Searchinger paper, which wasn't a proof, it was a hypothesis, even if an interesting one. When properly analyzed, I think indirect land use change (ILUC) will go away."

"When my chairman asked me why our pricing allowed customers to achieve a 30 percent internal rate of return, he rightly asked if we might possibly take a larger share of the pie. My background is in oil & gas, and I told him that when you go into the boardroom to compete for capital, the projects that are approved in this industry will need to be in the 25-30 percent bracket to win that competition, to make it interesting."

Verdezyne

Company description:

Verdezyne is a privately held company developing and commercializing novel genetically engineered microorganisms for use as "factories" to manufacture chemicals and fuels, using renewable feedstocks. Verdezyne's unique microorganisms permit greener, cleaner and more cost effective production of chemicals and fuels as compared with traditional methods. The Company is commercializing its technology through partnerships with leading chemical and fuel manufacturers.

Address:
Verdezyne, Inc.
2715 Loker Avenue West
Carlsbad, CA 92010

Year Founded: 2005

Chief Executive Officer:
E. William Radany, Ph.D.

Annual Revenues:
N/A

Major Investors *(if a public company, please provide trading symbol and exchange).*
OVP Venture Partners
Monitor Ventures
Tech Coast Angels
Life Science Angels

Type of Technology
Verdezyne's yeast platform, including the proprietary metabolic engineering methodology "Combinatorial Pathway Engineering" and trade secret algorithms for protein optimization, allows rapid and efficacious strain development methods to expand a versatile yeast production platform capable of using a variety of feedstocks such as 6-carbon sugars, 5-carbon sugars, fats, lipids and alkanes for the production of chemicals and fuels. Unlike many bacterial platforms, Verdezyne's yeast production platform has proven to be robust under large-scale industrial bio-processing conditions.

Verdezyne has demonstrated proof-of-concept results that include (a) the development of an engineered yeast that incorporates a unique glycolytic pathway that dramatically increases the production of ethanol; (b) an engineered yeast with a novel pathway which allows the fermentation of pentose sugars from lignocellulosic biomass; and (c) a feedstock flexible engineered yeast that converts alkanes, fats and oils or sugars to adipic acid. The Company is currently working on yield improvement and industrialization of these yeasts.

Feedstocks:
C6 sugars, C5 sugars (biomass, cellulosic sugars), plant-based oils, by-products from plant-based oil processing, paraffins

Fuel Type (if applicable): (e.g. ethanol, biobutanol, biodiesel, renewable diesel, renewable jet fuel, power etc)
Ethanol

Fuel Cost (if applicable - per US gallon): *(If you do not manufacture or have long-term stable feedstock pricing, please use the latest December futures contract pricing for traded feedstocks, or $55/ton for untraded biomass – or provide notes on your own feedstock pricing assumptions).*

Offtake partners (if applicable)

Co-products (if applicable)
The used biomass may be used in animal feed.

3 Top Milestones for 2009-10
- Production of adipic acid biologically
- Partnership agreement with Lallemand Ethanol Technologies to develop and commercialize a genetically enhanced high-yield ethanol producing yeast
- Production of adipic acid from vegetable oil (mixed fatty acids)

3 Major Milestone Goals for 2011-13
- Commercialize and sell (through our partnership with Lallemand) enhanced yeast, with increased yield and productivity, for current ethanol producers
- Announce commercial cellulosic ethanol partner
- Announce commercial adipic acid partner

Business Model: (e.g. owner-operator, technology licensor, fee-based industry supplier, investor)
Technology licensor

Competitive Edge(s):
Intellectual property around
Verdezyne is a product-focused company that is leveraging its technology platform to optimize the metabolic pathways, microorganisms and fermentation processes that enable economical production of renewable fuels and chemicals.

Verdezyne aggressively pursues intellectual property protection for all aspects of its technology platform and product portfolio. Verdezyne's yeast platform, including the proprietary metabolic engineering methodology “Combinatorial Pathway Engineering” and trade secret algorithms for protein optimization, allows rapid and efficacious strain development with pathways for ethanol, lignocellulosic ethanol and adipic acid.

Distribution, Research, Marketing or Production Partnerships or Alliances.
Lallemand Ethanol Technologies

Stage (Bench, pilot, demonstration, commercial)

- 1st Generation Ethanol: pilot-scale
- Cellulosic Ethanol: lab-scale
- Biobased Adipic Acid: lab-scale

Website URL : http://www.verdezyne.com/Verdezyne/index.cfm

YSI Life Sciences

Based in: Ohio

Business:
YSI Life Sciences is a part of YSI Incoporated. Founded in 1948 and formerly known as Yellow Springs Instrument Company, YSI develops and manufactures scientific instruments, sensors and systems that serve a variety of scientific, environmental, and industrial markets worldwide.

The YSI method uses immobilized enzyme electrodes to measure the glucose and xylose present. 13 μL of sample are automatically aspirated and delivered to the electrode chamber. Two electrodes develop signals proportional to the glucose and xylose present. Results are printed, displayed and stored after about 30 seconds. The system automatically clears sample from the electrode chamber and the next sample is ready to run. Turn around time is typically under two minutes.

Model:
Service provider

Past milestones:
In 2009, launched xylose sensor, an enzyme electrode membrane for use on the existing YSI 2700 SELECT and YSI 7100 MBS. Xylose and glucose sensors are configured in the same electrode chamber allowing simultaneous measurement of these sugars in one-minute.

Metrics:
The YSI enzyme electrode technology provides accurate one-minute results with minimal sample preparation.

Website:
www.ysilifesciences.com

Other eligible companies

A2BE Carbon Capture
Acitera
AE Biofuels
Ago Industrie
Agragen
Agrenco
Airbus
Algepower
Alpine Energy
AM Oil
Anellotech
Aquafuel Research
Ardent Energy
Arkansas Soy Energy
Arrow Energy
Athens Biodiesel
AXI
Badger State Ethanol
BAE Systems
Bayer/Athenix
Bay State Biofuels
Beacon Energy
Bentley Motors
Big River United Energy
Biocardel Vermont
Biocom
BioCube
Bioenergia
Bioenergy Systems
Bioexchange
Biogasol
Biojet
Biomass Secure Power
Biopetrol
Bioprocess Algae
Biopur
Biotericity
Boeing
Bronze Oak
BS Bioj
Buffalo Biodiesel
Canadian Bioenergy
Carbio AgraFuel
Carbon Science
Catalin
Central Farmers Cooperative
Cellana
Cello Energy
Cereal Process Technologies
Chemetha
Chevron
China Sun Biochem
Circle Biodiesel
Coastal Biodiesel
Companhia di Buzi
Continental Foods
Coshocton Ethanol
Cosmo Oil
Covanta
CPC Taiwan
Dalby Ethanol
Eastern Sugar
Easy Energy
EcoEnergy China
EcoFasa
Eco Global Bio Oils
Eco Plus
EcoSystem
Emami Biofuels
Encore Energy Systems
Endress + Hauser
Ensus
Environmental Power
Envergent Technologies
EverCat Fuels
Equatorial Biofuel/Agriterra
Evodos
Evogene
Evolution Fuels
FCL
First In Spec
First United Ethanol
FL Biofuels
Fort Dodge Ethanol
Four Rivers Bioenergy
Freedom Biofuels
GAEC
Galp Energia

Galten
GC Biofuels
Gea Biofuels
General Atomics
General Motors
Genomatica
Gleinol
Global Biofuels
Global Energy Holdings
Gold Star Biofuels
Gold Star Farms
Great Plaims – The Camelina Company
Green Plains Renewable Energy
Greenfield Ethanol
Green Gold
Greenhunter
Green Star Products
Guardian Energy
Gulf Alternative Energy
Gulf Hydrocarbon Partners
Hawkeye Renewables
Healy Biodiesel Magazine Helius Energy
Highwater Ethanol
HyPower
HR Biopetroleum
Husker Ag
Husky Energy
IBI
ICM
Imperium Renewables
InterAgro
Inland Empire Oilseeds
Innovation Fuels
Inventure Chemical
Jamaica Broilers
Jatoil
JR Camelina Seed
Kaaima Bio AgriTech
Kai Bioenergy
Kent Seatech
Kilimanjaro Biofuels
Kinder Morgan
Lignol
Live Fuels
Lightning Hybrids
Linde Group
Maple Energy
Martek
MDB Energy
Methes
Metso
Mettler Toledo
Mississippi Investment Petroleum
Monsanto
Myriant
MXI
New Generation Biofuels
N-Viro
Organic Bioenergy
OPX Biotechnologies
Orion Ethanol
Otter Tail
Oxem Biodiesel
Pacific Bio-Fields
Pacific Ethanol
PEMEX
Perdue
PetroCard
PetroChem Carless
PetroSUn
Pinnacle Energy
Polish Mills
Powers Energy of America
Prairie Pride
Promethius Carbon
Pro Natura
Proteus
QD Sciences
Quest Air
R-3 Energy
Reclaim Resources
REII
Renewable Fuel
Renewable World Energies
Renewafuel
Rex Stores
Rocky Mountain Sustainable
Ronn Vision Biofuels

Royal Cosun
SAAB
Saline Green
San Carlos
Sanimax
Schroeder Industries
Scipio Biofuels
Shree Ranuka Sugars
SK Chemicals
Solid Energy
Soy Mor Biodiesel
Springboard
Statoil
Stellar Wind Bioenergy
Sudanese Kenama Sugars
Suncor Energy
Sunset Ridge Algae
Tata
Terra Grain Fuels
TerraSol
Terra Sonics
Tharaldson Energy
Toyota
Tellurian Biodiesel
Tolero
Trillium
Uniol
United Utilities
US Biodiesel
Utica Energy
Valcent
Vale
Vega Biofuels
Veredium
Vivergo Fuels
WAL-Mart
Waste Management
Western Biofuels
White Energy
Ze-Gen
Zymetis

Biofuels Digest recommends:

The Red Hot and Hotter than Hell lists

In order to assist selectors, the Digest has prepared the following recommended companies for your Hot 50 consideration. A "hotter than hell" designation is included for selectors looking for assistance in identifying Top 10 and Top 20 candidates.

Red Hot
Abengoa Energy
Algenol
Amyris Biotechnologies
Aquaflow Bionomic
Aurora Algae
Bluefire Ethanol
BP Biofuels
Ceres
Chemrec
Cobalt Technologies
Codexis
Coskata
DuPont Danisco
Dynamic Fuels
Enerkem
ExxonMobil
Gevo
Iogen
Joule Biotechnologies
KL Energy
LanzaTech
LS9
Mascoma
Novozymes
OPX Biotechnologies
OriginOil
PetroAlgae
Petrobras
POET
Praj Industries
Qteros
Range Fuels
Renewable Energy Group

Rentech
Sapphire Energy
SG Biofuels
Shell
Solazyme
Solix
Synthetic Genomics
Targeted Growth
TMO Renewables
UOP
Verenium
Virent Energy Systems
ZeaChem

Hotter than Hell
Algenol
Amyris Biotechnologies
Bluefire Renewables
Ceres
Chemrec
Cobalt Technologies
Codexis
Cosan
Coskata
DuPont Danisco
Dynamic Fuels
Enerkem
Gevo
Joule Biotechnologies
LanzaTech
LS9
Mascoma
Novozymes
Petrobras
POET
Qteros
Range Fuels
Renewable Energy Group
Rentech
Sapphire Energy
SG Biofuels
Solazyme
Targeted Growth
TMO Renewables

UOP
Virent Energy Systems
ZeaChem