



Advanced Biofuel Market Progress Report

Ultra-Low Carbon Fuel Production Projections for 2015	
Fuel Type	Millions of Gallons/Year
Gas (or replacement)	654.65
Diesel (or replacement)	871.87
Ethanol	818.11
Drop-in renewable (diesel or gas)	2,242.33
Other	271.26
TOTAL	4,858.22

*Fuels with 50% reduction in carbon intensity from gasoline or diesel baselines

*Data represents currently active companies in U.S. and Canada plus major international companies that could export into California.

*Projections based on data given directly to E2 or acquired through press releases. For some companies data was unavailable.

*In some cases company forecasts were reduced to reflect challenges unique to each company (e.g., low investment, lack of demonstration plant, etc.)

*Projections shown in aggregate form to protect individual company information

Report Outline

1. The Biofuel Industry Today

A. From Start-Ups to Publicly Traded Companies

- ▲ 156 existing companies in the U.S. and Canada that produce biofuels with:
 - Carbon Intensity (CI) at least 50% less than gasoline from crude oil
 - Most are 75% lower
- ▲ 23 major international companies that could access the California Market.

B. Public and Private Financing in the Biofuel Industry

- ▲ Private Financing
 - \$1.79 billion of VC investment in active North American projects from 2007- Q1 2011
- ▲ Public Financing
 - U.S. Department of Agriculture Loan Guarantees – 3 projects in operation
 - U.S. Department of Energy Loan Guarantees – 8 projects in operation
 - AB 118 - 3 Calif biofuel producers plus 2 supportive technology providers

2. Projection Biofuel Production Volume in 2015

- A. Characterizing the Growing State of the Biofuel Industry
 - ⤴ Public Market Growth – Four advanced companies' IPO Success
 - ⤴ Governmental Policy – Renewable Fuel Standard 2 (RFS2) and the Low Carbon Fuel Standard (LCFS)
 - ⤴ The increasing cost of oil as a biofuel market stabilizer
 - ⤴ Cost of feedstock and the bifurcation of the biochemicals and biofuels market
 - ⤴ Shift to scaling of commercial production
 - ⤴ Consolidation and integration – current transition trends

- B. Future Biofuel Market
 - ⤴ Projected capacity for 2015 – 4.858 billion of very low carbon biofuel
 - ⤴ Market Challenges – Type of fuel production and targeting high-margins markets

3. Perspectives on Achieving the Volume Production

- A. The Venture Capitalist Perspective
 - ⤴ Biomass
 - ⤴ Price stability
- B. Paths to Commercial Success: Lessons from Biofuel IPOs
- C. Challenges
 - ⤴ Outgrown VC levels
 - ⤴ Low margins for strategic investments (8-10%)
 - Oil companies need to see biofuels as a regulatory requirement to make up difference in ROI
 - Producing chemicals/higher value products near term as an on-ramp
- D. Policy Needs from Industry
 - ⤴ Credit trading market
 - ⤴ Off-take agreements
 - ⤴ Price and regulatory stability

4. Meeting the LCFS – Scenarios for California

- A. Minimal technology risks – risk in production, feedstock, and infrastructure
- B. Feedstock development – woody biomass and low-cost sugars
- C. Latin American fuels
- D. Clear price on carbon – incentivizing fuel deliver to California
- E. Third generation biofuels – Algae and CO₂ Capture
- F. Other areas: Non-sunlight photosynthesis and MSW

5. Conclusions

Appendix:

- A. How much will be produced in California?
- B. What are the conditions under which these would be produced in California?
 - ⤴ Feed-stock availability, business and community climate factors

Private Investment into Biofuel Companies				
<i>likely to produce fuel with 75% or greater reduction in carbon intensity from gasoline or diesel baselines</i>				
Company	Fuel Type	Private Investment (Millions \$)	Website	State/Country
Algae Producers Inc.	Algae		www.algae producersinc.com	
Aurora Algae	Algae	48.41	www.auroraalgae.com	CA
Bodega Algae LLC	Algae		http://www.bodegaaalgae.com/	MA
Garden State Ethanol	Algae			NJ
General Atomics	Algae		http://www.gat.com	CA
Green Star Products	Algae		www.greenstarusa.com	NJ
Kent Bioenergy	Algae		http://www.kentbioenergy.com/	CA
Linkage Biosciences, Inc.	Algae		http://www.solazyme.com/	CA
Origin Oil	Algae		www.originoil.com	CA
PetroAlgae	Algae	10	http://www.petroalgae.com/index.php	FL
Renewed World Energies	Algae		www.rwenergies.com	SC
Sapphire Energy	Algae	101.4	www.sapphireenergy.com	CA
Solazyme	Algae	121.91	http://www.solazyme.com/	CA
Solix	Algae	36.9	www.solixbiofuels.com	CO
SunEco Energy	Algae		http://sunecoenergy.com/index.cfm	CA
Synthetic Genomics	Algae		http://www.syntheticgenomics.com/	CA
Algenol	Algae		www.algenolbiofuels.com	FL
Bio Architecture Lab, Inc.	Algae		http://www.ba-lab.com/	CA
Dynamotive	Bio-oil	10.5	http://www.dynamotive.com/about/	Canada
Naturally Scientific	Bio-oil		www.naturally-scientific.com	China
Gevo Development	Biobutanol	66.1	www.gevo.com	CO
Butamax	Biobutanol		www.butamax.com	DE
Cobalt Technology	Biobutanol	50.5	www.cobaltbiofuels.com	CA
Imperium	Biodiesel		www.imperiumrenewables.com	WA
BARD	Biodiesel		www.bardllc.com	PA
SG Biofuels	Biodiesel		www.sgbiofuels.com	CA
Orbitek	Biodiesel		http://www.orbitekinc.com/	OK
Renewable Energy Group	Biodiesel		www.regfuel.com	CA
sequential	Biodiesel		www.sqbiofuels.com	OR
Dynamic Fuels	Biodiesel		www.dynamicfuelsllc.com	LA
Crimson renewables	Biodiesel		http://www.crimsonrenewable.com/	CA
Amyris Inc.	Biodiesel	215.945	http://www.amyrisbiotech.com/	CA
Baystate Biofuels	Biodiesel		www.baystatebiofuels.com	MA
Beaver Biodiesel	Biodiesel		www.chemtools.com	OR
Benefuel Inc	Biodiesel		http://www.benefuel.net/	IL
Bio-fuels Inc	Biodiesel		http://bio-fuelsusa.com/	FL
Blue Sky Biofuel	Biodiesel		http://www.blueskybio-fuels.com/	CA
Blue Sun	Biodiesel		www.gobluesun.com	CO

Buffalo Biodiesel Inc	Biodiesel		http://www.buffalobiodiesel.com/	NY
Community Fuels	Biodiesel		www.communityfuels.com	CA
CV Biofuels	Biodiesel		http://www.cvbiofuels.com/	CA
Future fuel	Biodiesel		http://www.futurefuelcorporation.com	AR
Greenleaf Biofuels	Biodiesel		www.greenleafbiofuels.com	CT
Interstate Biofuels	Biodiesel		www.interstatebiofuels.com	NY
Keystone BioFuels	Biodiesel		www.keystonebiofuels.com	PA
Life Technologies	Biodiesel		http://www.lifetechnologies.com/	CA
LS9	Biodiesel		www.ls9.com	CA
NextFuels	Biodiesel		www.nextfuels.com	CA
Renewable Fuel Products	Biodiesel		www.renewablefuelproducts.com/	CA
SBI Bioenergy	Biodiesel		www.sbibioenergy.com	Alberta
Simple Fuels	Biodiesel		www.simplefuels.com	CA
Simply Green Biofuels	Biodiesel		www.seacoastbiofuels.com	NH
Trenton Fuel Works	Biodiesel		http://www.trentonfuelworks.com/	NJ
Tri-State Biodiesel	Biodiesel		www.tristatebiodiesel.com	NJ
TerViva	Biodiesel		http://www.terviva.com/index.php	CA
Blue Marble Energy	Biogas		http://bluemarbleenergy.net/	WA
Virent	Biogas	76.14	http://www.virent.com/index.html	WI
KIOR	Biomass	111.469	www.kior.com	TX
BIOX Corporation	Diesel	52.8	www.bioxcorp.com	Canada
AlgaeVenture Systems	Diesel	1.5	http://www.algaevs.com	OH
General Biodiesel	Diesel	9.5	http://generalbiodiesel.com/index.php/	WA
Global Green Solutions	Diesel	3.8	www.globalgreensolutionsinc.com	Canada
Green Pacific Biologicals	Diesel	0.225	www.greenpacificbio.com	CA
Inventure, Inc.	Diesel	1.5	www.inventurechem.com	WA
Kumho Petrochemical	Diesel		http://www.kkpc.co.kr/eng/index.asp	Korea
MBD Energy	Diesel		www.mbdenergy.com	Australia
SBAE Industries	Diesel	1.2	http://www.sbae-industries.com/	Belgium
Diamond Green	Diesel		valero.com	LA
Endicott Biofuels, LLC	Diesel	40	http://www.endicottbiofuels.com	TX
Greenline Industries, LLC	Diesel	20	http://www.greenlineindustries.com/	CA
Gushan Environmental Energy Ltd	Diesel	25	http://www.chinagushan.com/en/	China
Memphis Biofuels LLC	Diesel	1.65	http://www.memphisbiofuels.com/	TN
Northeast Biodiesel	Diesel	0.96	http://www.northeastbiodiesel.com/	MA
Australian Renewable Fuels	Diesel		http://www.arfuels.com.au/	Australia
Biofuel Industries Group	Diesel	9	http://www.nextdiesel.net	MI
Biotor Industries Limited	Diesel	38.5	http://www.biotorindustries.com	India
REII	Diesel		www.reiinternational.com	CA
Rentech	Diesel		http://www.rentechinc.com/	CA
Safe Renewables Corporation	Diesel	5	http://www.saferenewables.com/	TX
Cool Planet Biofuels	Ethanol	34.5	www.coolplanetbiofuels.com/	CA
American Process Inc	Ethanol		www.apiweb.com	GA

Fulcrum Bioenergy	Ethanol	95	http://www.fulcrum-bioenergy.com/	CA
KL Energy Corp	Ethanol	4	http://www.klenergycorp.com	SD
Lanza Tech	Ethanol		http://www.lanzatech.co.nz	China
Novogy	Ethanol	0.75	http://www.novogyinc.com/	MA
Petrobras	Ethanol		http://www.petrobras.com.br/en/	Brazil
Powers Energy	Ethanol		www.powersenergyofamerica.com	IN
Praj Industries	Ethanol	29.3	http://www.praj.net	India
TMO Renewables	Ethanol	58.1	http://www.tmo-group.com/	UK
Weyland / Statoil Hydro	Ethanol		http://weyland.no	Norway
Woodland Biofuels	Ethanol	5.2	http://www.woodlandbiofuels.com/	Canada
Borregaard	Ethanol		www.borregaard.com	Norway
COFCO/Sinopec	Ethanol		english.sinopec.com	China
Fiberight	Ethanol		www.fiberight.com	MD
Qteros	Ethanol		www.qteros.com	MA
ClearFuels	Ethanol -Cellulosic	3.5	www.clearfuels.com	HI
AE Biofuels	Ethanol -Cellulosic		www.aebiofuels.com	CA
Allopartis Biotechnologies	Ethanol -Cellulosic	0.75	http://www.allopartis.com/	CA
C5-6 Technologies	Ethanol -Cellulosic		http://www.c56technologies.com/	WI
Ceres Biofuels	Ethanol -Cellulosic		www.ceres.net	CA
Citrus Energy	Ethanol -Cellulosic		www.citrusenergy.net	FL
Enerkem	Ethanol -Cellulosic	63.58	www.enerkem.com	Quebec
Genahol	Ethanol -Cellulosic		http://www.genahol.com/	OH
Genencor	Ethanol -Cellulosic		www.genencor.com	NY
Gulf Alternative Energy	Ethanol -Cellulosic		www.gulfalternativeenergy.com	TX
Inbicon	Ethanol -Cellulosic		www.inbicon.com	Denmark
INEOS Bio	Ethanol -Cellulosic		www.ineosbio.com	IL
Iogen	Ethanol -Cellulosic		www.iogen.ca	Ontario
Lignol Biofuel	Ethanol -Cellulosic		http://www.lignol.ca/about.html	BC
Masada	Ethanol -Cellulosic		www.masadaonline.com	AL
Mascoma	Ethanol -Cellulosic	131	www.mascoma.com	NH
Mendota Advanced Bioenergy	Ethanol -Cellulosic			CA
Purevision Technology, Inc.	Ethanol -Cellulosic		http://www.purevisiontechnology.com	CO
SunOpta	Ethanol -Cellulosic		http://www.sunoptabioprocess.com/	Ontario
Syntec Biofuel	Ethanol -Cellulosic		www.syntecbiofuel.com	BC
Zechem	Ethanol -Cellulosic		http://www.zechem.com	WA
Altra Biofuels	Ethanol -Cellulosic		http://www.altrabiofuels.com	CA
BlueFire Ethanol	Ethanol -Cellulosic	10	http://bluefireethanol.com/	CA
Coskata	Ethanol -Cellulosic	93.2	www.coskata.com	IL
DDCE	Ethanol -Cellulosic		www.ddce.com	IL
Caitlin	Ethanol - Corn			IA
Calgren Renewable Fuels	Ethanol - Corn		www.calgren.com	CA
EdeniQ	Ethanol - Corn		www.edeniq.com	CA
GreenShift Corporation	Ethanol - Corn		http://www.greenshift.com/	NY
POET	Ethanol - Corn		www.poet.com	SD

CORE Biofuel	Gas - Renewable		www.corebiofuel.com	BC
Primus Green Energy	Gas - Renewable		http://www.hclcleantech.com	NJ
Murphy Oil	Gas - Renewable		www.murphyoilcorp.com	AR
Blue Fuel Energy Corporation	Gas-Renewable		www.bluefuelenergy.com	BC
Aquatic Energy	Multiple Fuels		www.aquaticenergy.com	LA
Joule Biotechnologies	Multiple Fuels	30	http://www.jouleunlimited.com/	MA
LiveFuels	Multiple Fuels	10	www.livefuels.com	MA
Neste Oil	Multiple Fuels		www.nesteoil.com	Finland
Valero (w/ Darling International Inc.)	Multiple Fuels		www.valero.com	TX
BP Alternative Energy	Multiple Fuels		www.bp.com	CA
Verdezyne	Multiple Fuels		http://www.verdezyne.com	CA
Abengoa	Multiple Fuels		www.abengoabioenergy.com	MO
Ensyn Corporation	RDIF	3	http://www.ensyn.com/	Malaysia
Qantas/Solena	RDIF		http://www.solenafuels.com/	Australia
SCIPIO Biofuels	RDIF		http://www.scipiobiofuels.com/	CA
Sundrop Fuels	RDIF		http://www.sundropfuels.com	CO
Terrabon	RDIF	1.25	www.terrabon.com	TX

Private Investment into Biofuel Companies

*likely to produce fuel with **less than 50% reduction** in carbon intensity from gasoline or diesel baselines*

Company	Fuel Type	Private Investment (Millions \$)	Website	State
Bunge	Ethanol - Sugarcane		http://bunge.com	MO
GlycosBio	Ethanol - Sugarcane		www.glycosbio.com	TX
US Envirofuels	Ethanol - Sugarcane		http://www.usenvirofuels.com/	FL
Brazilian Renewable Energy Company Ltd.	Ethanol - Sugarcane		http://www.eth.com	Brazil
Nella Oil	Ethanol		http://nellaoil.com	CA
OPX Biotechnologies, Inc.	Ethanol	21.1	www.opxbiotechnologies.com/	CO
Pacific Ethanol	Ethanol		www.pacificethanol.net	CA
Santelisa Vale SA	Ethanol	212		Brazil
ABRI Tech (Advanced BioEnergy, LLC)	Ethanol		www.advancedbioenergy.com	MN
Archer Daniels Midland	Ethanol		www.adm.com	IL
Biofuel Energy Corporation	Ethanol		http://www.bfenergy.com/	CO
DENCO, LLC	Ethanol		http://www.dencolc.com/	MN
GreenField Ethanol	Ethanol		www.greenfieldethanol.com	Ontario
Standard Ethanol, LLC	Ethanol	1.5	www.standard-ethanol.com/	NE
Green Plains Renewable Energy, Inc.	Ethanol	9.7	http://www.gpreinc.com/	NE
NorAmera BioEnergy Corporation	Ethanol	3.1	www.noramerabioenergy.com/	Canada

Private Investment into Biofuel Companies				
<i>carbon intensity values unknown</i>				
Company	Fuel Type	Private Investment (Millions \$)	Website	State
Chesapeake Green Fuels	Biodiesel		http://www.cgfcorp.com/	MD
IWP	Biodiesel		imperialwesternproducts.com	CA
Valley Biodiesel, Inc.	Biodiesel			CA
BioFuels Energy, LLC	Biogas		www.biofuelsenergyllc.com	CA
Bionersis SA	Biogas	20.4	http://www.bionersis.com/	France
Green Gas International BV	Biogas	20.86		UK
Seaweed Energy Solutions	Biogas		seaweedenergysolutions.com	Norway
Ze-Gen	Biogas		www.ze-gen.com	MA
Flambeau River Biofuels	Diesel		www.flambeauriverpapers.com	WI
Hebei Zhenghe	Diesel	2		China
Aventine Renewable Energy	Ethanol		http://www.aventinerei.com/	IL
EcoTech Fuels, LLC	Ethanol		www.ecotechfuels.com	CA
Helios	Ethanol			PA
Logos Technologies	Ethanol-Cellulosic		www.logostech.net	
Verenium	Ethanol-Cellulosic			
Zero Emission Energy Plants Ltd.	Ethanol	38	http://www.zeep.com/	TX
Balqon	Gas -Renewable		http://www.balqon.com/	CA
Zeropoint	Gas -Renewable	3.12	www.zeropointcleantech.com	NY
Chevron	Multiple Fuels		www.chevron.com	CA
Diversified Energy	Multiple Fuels		www.diversified-energy.com	AZ
SynGest	RDIF			CA