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# Renewable & Alternative Fuels Industry

*An Overview to Israel's Ministry of Energy Staff  
June 18, 2007 Tel Aviv, Israel*

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# Andrew Kurth, LLP

## Mark Riedy, ESQ, Andrew Kurth, LLP

### *Introduction*

- Have Represented Clients For Renewable Energy Since 1978 Domestically And Internationally
- A Founder And Original General Counsel:
  - Renewable Fuel Association –1979-1984
  - Clean Fuels Development Coalition – since 1985
  - Clean Fuels Foundation – since 1990
  - American Council on Renewable Energy – since 2001
- Key Lobbyist On Creation Of Alternate Energy Tax Credits Incentives In The 1978 And 1980 Tax Acts

# Kreido Biofuels, Inc.

## Larry Sullivan

### Chief Technology Officer

- Kreido Biofuels, Inc. has invested US\$20 million to provide the world renewable energy through its proprietary process intensification technology - the STT® system.
- The Company is currently developing biodiesel plants in the U.S. that will have an anticipated aggregate nameplate capacity of 100 million gallons per year (333,000 mt/yr). Kreido's plants are built around its STT® 30G biodiesel production unit, a complete pipe-to-pipe biodiesel production system that significantly improves the efficiency, quality, and process control of biodiesel production.
- Committed to building a sustainable future, Kreido Biofuels' plants have a smaller footprint and offer feedstock flexibility. The Company plans to license its biodiesel technology internationally and to third-party biodiesel producers.

# Kreido Biofuels, Inc.

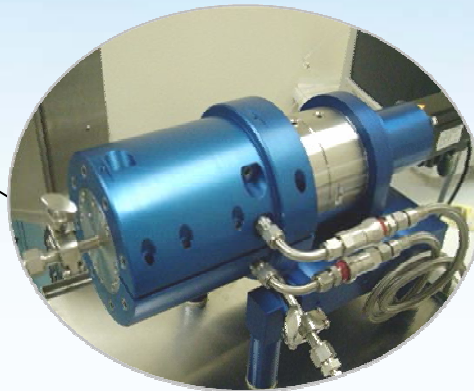
## Sullivan's previous positions include:

- Delta-T Corporation - Led the biodiesel business development efforts from 2005 to 2007
- World Energy, part of Gulf Oil Group - Completed development of the biodiesel market in the Midwest which involved critical negotiations for supply of biodiesel to leading Midwestern petroleum refiners, distributors and suppliers from 2004 to 2005
- Crown Iron Works Company - Led the strategic design and product marketing team developing the first generation of biodiesel production technology from 2002 to 2004
- Consultant to Petroleum Refining and Renewable Fuels/Chemical companies 1994 to 2002
- Conoco U. K. and Dupont International S.A. - Led refining strategy development for Europe in planning their efforts in integrating refinery and petrochemical intermediates from 1990 to 1994

# Kreido Biofuels Business Strategy: Leverage Synthetic Diesel from Biomass as the future of transportation

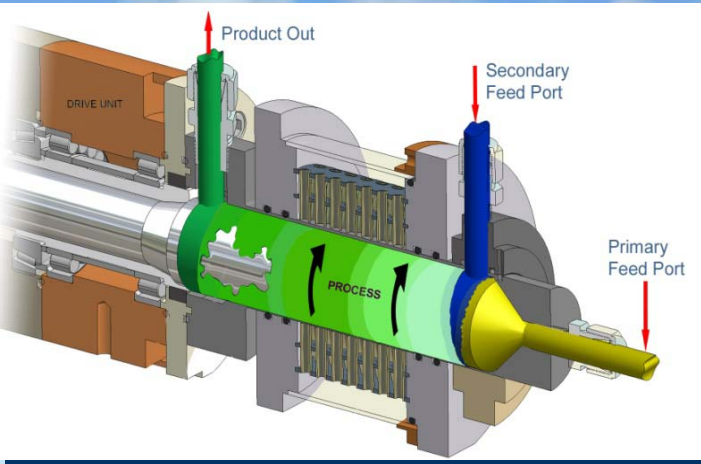


Develop three 33 million gallons/yr (110,000 mt/yr) biodiesel plants, targeted operational in 2008



Licensing STT<sup>®</sup> technology while continuously innovating

# Kreido's STT<sup>®</sup> Technology Overview



- 7 years and US\$20+ million to develop the STT<sup>®</sup> Reactor, the heart of the STT<sup>®</sup> 30G
- STT<sup>®</sup> (spinning tube-in-tube) biodiesel reactor
- Protected by numerous worldwide patents
- Thin film, high shear reactor system
- ASTM-quality biodiesel in less than one second reactor residence time

# Kreido Biofuels Plant

## STT<sup>®</sup> Technology Benefits

- Compared to conventional biodiesel production units:
  - Smaller environmental and physical footprint
    - >3,000 Gal/sq ft-yr or 10 mt/0.1 sq mt-yr
  - Less expensive to build
    - >40% capital cost advantage than standard plant
    - Faster time to market
    - Modular Biodiesel Processing Unit or BPU is available to a prepared sites in ~7 months
  - Lower biodiesel production costs
    - ~US\$0.10/gallon or US\$0.026/liter processing cost advantage
  - Safer to operate
  - Waterless, continuous-flow process
  - Operates at low temperature
  - Multi-feedstock flexibility
  - Greater production yield; nameplate capacity of 33 million gallons/yr (110,000 mt/yr)
  - Production units can be combined for greater capacities in parallel

# Technology Licensing Opportunities

- National & International Business Strategy
  - License STT® Biodiesel Production Units to third-party plants in exchange for feedstock commitments, annual license fees, production royalties, and equity
  - Additional equity investment in select plants
- Initial Target Regions
  - United States
  - Israel
  - Europe
  - China
  - Africa
  - Malaysia and Indonesia
  - Central and South America
  - India

# Marketplace Overview

## Ethanol (ethyl alcohol from grains and sugar cane)

- Current U.S. Market – Approximately 5.6 billion gallons/yr (17 million mt/yr). Production in 124 Plants versus Brazil – Approximately 5.4 billion gallons/yr production (16 million mt/yr) today / both are doubling over next 2 years
- Current U.S. Construction – Approximately 6 billion gallons/yr (19 million mt/yr) production in 84 confirmed projects to come on line by December 31, 2008. Over 100 proposed plants that could reach towards 20 million mt/yr additional volumes but not realistic – margins lower
- 2015 – Expect more than 16 Billion Gallons/Year (48 million mt/yr) and production from Corn/Grain with move to Cellulosic Fuel Ethanol Plants
- Fuel Ethanol Qualifies for a 1.0 Renewable Fuels Standard (RFS) Credit/Gallon for a Grain-Based Gallons and a 2.5 RFS Credit/Gallon for a Cellulosic – Based Gallon. Biofuels produced from Manufacturing facilities powered by 90% or greater percentages of Non-Hydrocarbon – based fuel also will receive a 2.5 RFS Credit/Gallon. RFS Credits are monetizeable (can be sold by refiners to other refiners).

# Marketplace Overview

## Biodiesel (mono alkyl esters from long chain fatty acids)

- Current U.S. Market – Approximately 300 million gallons/yr market in 137 Plants (1 million mt/yr). Capacity is near 600 million gallons/yr (2 million mt/yr) in dedicated and non-dedicated oleochemical and chemical plants.
- Current U.S. Construction – Approximately 600 million gallons/yr production in 179 New Plants to be operational by December 31, 2007 (3 million mt/yr)
- 2015 – Expect more than 1.5 billion gallons/yr (5 million mt/yr) production
- Europe – Approximately 4x the size of current US Market at Approximately 1.2 billion gallons/yr production (4 million mt/yr)
- Biodiesel Qualifies for a 1.5 RFS Credit/Gallon
- US diesel fuel market is 22% of total market

# Marketplace Overview

## Renewable Diesel (thermo-depolymerized oils and fats)

- Current U.S. Market – Less than 100 million gallons/yr (300,000 mt/yr) production. Process is used in the EU by Neste Finland
- New ConocoPhillips – Tyson Foods Joint Venture Estimates That Its Joint Venture will provide in 175 Million Gallons/Year Production by December 31, 2008 (590,000 mt/yr) - as a result of IRS Notice 2007-37 (issued March 2, 2007, published April 3, 2007) which “makes workable” the Renewable Diesel Tax Credit of \$1.00 per gallon through the broad definition of “thermal depolymerization”.
- Projected U.S. Production - 2 billion gallons/yr (7 million mt/yr) production by 2012 with little production capacity increase by using existing facilities – Hydrotreaters and Hydrocrackers
- 2015 – Could be Very Significant Production
- Renewable Diesel Qualifies for a 1.7 RFS credit/gallon

# Marketplace Overview

## ***Alternative Fuels – Hydrocarbons/Biomass-to-Liquids***

CTL – Coal-to-Liquids (or petroleum coke to liquids)

- 150,000 barrels/day facilities in South Africa on Sasol Process (since 1955). This is 24,000 mt/day or near 8 million mt/yr
- 11,000 barrels/day – 50,000 bbl/day CTL facilities projected for construction in Wyoming and Illinois on Fisher – Tropsch process, which converts coal to syngas before conversion to a liquid at high temperatures. Liquids can be used as synthetic diesel

GTL – Gas-to-Liquids (natural gas or methane to liquids)

- Andrews Kurth is representing a client on the development, finance and construction of a 200 million gallon/yr (660,000 mt/yr) GTL Manufacturing Facility on tribal (Native American) land in Oklahoma.
- At present, Pilot Plants only exist with less than 25 million gallons/yr (90,000 mt/yr) production capacity.

BTL – Biomass-to-Liquids

- No projects exist in the U.S. to date.

# Marketplace Overview (Continued)

## ***Alternative Fuels – Hydrocarbons/Biomass-to-Liquids***

- Current Markets – Very Small in U.S./Growing in Europe
- 2015 – Could be Very Significant Production
- All of these CTL, GTL, BTL fuels will use similar biodiesel feedstocks (plant oils, animal fats, biomass-based greases) or agricultural/municipal cellulose wastes in a Fisher Tropsch process to qualify as Renewable Diesel for the \$1.00/gallon Renewable Diesel Tax Credit. Pending legislation may qualify these Alternative Fuels for the RFS Credit/Gallon and extend the RFS Credits beyond Transportation Fuels Burned in Boilers and Home Heating.

# Renewable/Alternative Fuels Legislation

## Legislatively Mandated Markets

- RFS or Renewable Fuel Standard - (Qualifies Domestic – and Imported Foreign – Produced Biofuels and Renewable Diesel) – 7.5 billion gallons/yr (22 million mt/yr) by 2012; Today – In September 2007 the U.S. Environmental Protection Agency issues Ratios
- Proposed National Legislative Mandates:
  - RFS – Bingaman/Domeneci Bill – Proposed 36 billion gallons/yr (107 million mt/yr) Mandate by 2022 (Qualifies Domestically – Produced Biofuels Only) recently merged into Senator Reid’s Renewable Fuels, Consumer Protection and Energy Act of 2007 (S. 1449).
  - AFS – Alternative Fuels Standard – State of Union/now a House Energy & Commerce Discussion Draft – Proposed 35 billion gallon/yr (105 million mt/yr) Mandate by 2017 (Qualifies Domestic – and Imported Foreign - Produced Biofuels, Renewables Diesel, CTL, GTL, BTL and other Alternative Fuels). Congressman Boucher proposes to introduce the AFS in a bill with the same mandate, but commencing later – 2013 - 2025.

# Project Financing Models

## Grain-to-Ethanol

- Debt/Equity Ratio – was 70%/30% and now below 60%/40%
- CAPEX increasing from approximately US\$1.00/gallon or US\$0.26/liter (less than 2 years ago) to approximately US\$1.90-2.15/Gallon (over \$6/liter) today due to substantially increasing stainless steel prices and lack of 1<sup>st</sup> Tier Process Engineering Companies. Delta-T and Bateman Litwin in Europe.
- Operating Costs – approximately \$1.10/Gallon (US\$0.29/liter) reduced to approximately \$0.61/Gallon (US\$0.16/liter) through a 51 cents per gallon volumetric ethanol excise tax credit (VEETC), based on \$3.50/bushel corn (US\$ 158/mt maize) and US\$8/mm BTU natural gas.
- ROI low 20%. -- These ROIs were higher than 50% one year ago, when grain prices were at approx \$2.00/bushel or less and ethanol sales prices were at more than \$4.00/gallon.

# Project Financing Models

## Cellulose-to-Ethanol (or other alcohols, like butanols)

- Debt/Equity Ratio – Substantially less than 50%/50% with required significant equity percentages, as debt shies away from pre-commercial industry – U.S. Department of Energy (DOE) loan guarantees are a must in addition to the need for up to 40% of DOE equity in initial projects.
- CAPEX -- \$3 - \$4/Gallon (US\$0.78 – 1.04/liter)
- Still pre-commercial – but commercialization within 2-5 years. Thus, the ROI is yet to be determined.
- Operating Costs to range between \$1.30 - 2.45/ Gallon (US\$0.34- 0.65/liter) depending on feedstock – the upper amount is based on US\$10 – 20/mt of switchgrass feedstock and US\$8/MMBTU natural gas project fuel) in the short-term and \$1.00/Gallon by 2020, without applying available tax incentives versus \$0.61/Gallon for grain ethanol with tax incentives; post 2020 – such costs could be reduced well below \$1.00/Gallon to a range of \$0.25 to \$0.50 per gallon without using tax incentives.

# Project Financing Models

## Biodiesel

- Debt/Equity Ratio – has maintained at approximately 50%/50%.
- CAPEX moving from \$1.00/Gallon (US\$0.26/liter) to \$0.25 to \$0.50/Gallon (outside US and EU) due to increasingly better technologies, lower production costs (as industry moves away from steel to composites and uses other technology advancements) and growing numbers of Process Engineering Companies (top Tier Performers not as important for biodiesel versus ethanol plants). Israel and drip irrigated jatropha with Bateman.
- Operating Costs are Approximately \$2.80 - \$3.00/Gallon (at least \$2.30/Gallon constitutes feedstock costs), reduced to \$1.80 - \$2.00/Gallon by \$1.00/Gallon Agribiodiesel Tax Credit for Biodiesel produced from Virgin (plants and animal fats) Feedstocks or to \$2.30 - \$2.50/Gallon by \$0.50/Gallon Biodiesel Tax Credit produced from Non-Virgin (biomass - based greases and other recycled biomass- based) Feedstocks. Integrated oilseed agriculture and processing are key.
- ROI – 7% to 18%, with the higher returns if the Developer owns the oilseeds and extraction. These ROIs were higher than 50% one year ago.

# Project Financing Models

## Renewable Diesel

- CAPEX - near US\$0 unless required to segregate diesel from other products with existing hydrotreaters.
- If the latter, the CAPEX for new hydrotreaters is approximately up to twice the cost of the similar capacity produced in a biodiesel manufacturing facility. Over US\$0.50/liter in EU.
- Operating Costs – Approximately \$2.50/Gallon (US\$0.65/liter) reduced by the \$1.00/Gallon (US\$0.26/liter) Renewable Diesel Tax Credit regardless of whether using the same Virgin or Non-Virgin (used restaurant oils). Same feedstocks as used for Biodiesel.
- CETANE Rating is nearly 100 for Renewable Diesel versus 60-65 for Biodiesel versus 40-45 for Petroleum Diesel.
- Pipeline Fungible (while the “perception” is that Biodiesel is not).
- ROI – 20% to 30%, with the higher returns if integrated into, instead of outside of, the petroleum refinery.

# Project Financing Models

## *Hydrocarbons/Biomass-to-Liquids*

### CTL

- CAPEX = Approximately \$2.00 to \$3.30/Gallon (US\$0.53-0.86/liter), based on a 330 million gallon/yr (1 million mt/yr) Production Facility.
- Operating Costs = Less than \$1.00/Gallon (US\$0.26/liter) is based on a US\$21/mt low sulfur Western U.S. coal
- 5-8 years to construct, but 5-7 years to recoup investment
- ROI - 14%-20% in near term. Oil prices must remain in a US\$50/BBL - US\$60/BBL range to attract lenders.

# Project Financing Models

## *Hydrocarbons/Biomass-to-Liquids*

### GTL

- CAPEX = Approximately US\$6.00/Gallon - 11.00/Gallon (US\$1.55-3.10/liter), based on 800 million gallon/yr (2.7 million mt/yr) Production Facility, at US\$5 – 9 Billion Total Project Cost
- Operating Costs = Greater than \$1.00/Gallon (based on \$8 MM BTU natural gas). However, Qatar gas is valued at US\$0.80/MM BTU, one order of magnitude lower
- ROI – Less than 14% in near term Shell and SASOL/Chevron moving ahead but ExxonMobil pulled out of Qatar

### BTL

- CAPEX = Approximately US\$1.50 to \$3.50 Gallon (US\$0.40 -1.00/liter) based on a 200 million gallon/yr (800,000 mt/yr) Production Facility
- Operating Costs = Less than US\$1.00/Gallon (US\$0.26/liter) based on \$2//mt biomass)
- ROI – 14% - 20% in near term

# Project Financing Models

## *Hydrocarbons/Biomass-to-Liquids (continued)*

- Operating Costs for CTL, GTL and BTL are reduced by the \$1.00/Gallon (US\$0.26/liter) Renewable Diesel Tax Credit
- Debt/Equity Ratio will require equity at percentages well above 50%
- ROIs would increase with monetizeable credit streams -- Increased/Expanded Tax and Production Incentives, RFS, Emissions, Renewable Energy Certificates (RECs), etc. – and advances in technologies reducing project costs
- Generally, these projects will not be farmer owned like ethanol and biodiesel. These require such large capital expenses and non-agricultural feedstocks that only large firms will build. ADM CEO came from Chevron.

# Private Equity/Venture Capital Financing/Hedge Funds/High Net Worth Individuals

- Smaller Projects – All equity (Private Equity or VC) with project finance after commencement of commercial operations.
- Larger Projects – Private Equity, Hedge Funds and/or strategic investors/high net worth individuals are used for project equity with exits in 3-5 years.
- VC funding used for significant portions of equity in higher risk biofuels projects – e.g. cellulosic ethanol (which require government loan guarantees to secure otherwise skittish debt finance).
- Merger & Acquisitions Strategy/Private Equity Entrance require existing facilities – especially smaller plants.

# Capital Market

- Reverse Mergers of private development companies into public shells (Bulletin Board, OTC, etc.) followed by PIPEs (private investment into public enterprises) for development of biofuels projects
- IPOs on NASDAQ/AIM (Alternative Investment Market of London Stock Exchange) to raise money for:
  - Biofuels development companies to develop/ invest in new projects
  - Funding investment funds (particularly through the AIM) to on-invest into biofuels projects
  - Special Purpose Acquisition Companies (SPACs) raising funds on NASDAQ and AIM to acquire existing biofuels companies/projects within specified periods of time
  - The IPOs recently were downgraded by Bank of America Securities due to decreased margins

# Monetization of Emissions/Tax & Energy Credits

- These credits create new project revenue streams, Risk Mitigation and/or Loan Security Mechanisms:
  - Kyoto Protocol Credits
  - Clean Air Act Credits
  - RFS Credits Under the Energy Policy Act of 2005
  - State Industrial Carbon Credits (California, NY State, and New England States)
  - RECs under State Renewable Portfolio Standards
  - Federal and State Tax Credits
  - State Production Payments

# Recent Renewable Energy Transactions

## *Andrew Kurth's recently closed transactions:*

- American Ethanol – 50 million gallon/yr (150,000 mt/yr) biodiesel facility closed in India on a private equity basis (US\$21 million), with project financing through local Indian debt to occur after the commercial operation date. The project produces approximately 400,000 carbon offsets valued at approximately US\$5.6 million annually.
- Dynoil Corporation has entered into a US\$100 million agreement with GE and Trunz (the first of several similar agreements) to manufacture and provide 200-Watt solar modules and 5,125 water filtration units (destined for India) that are capable of providing 7.57 cubic meters (2,000 U.S. gallons) of clean potable water, or enough water to meet the daily requirements for 600 people. By utilizing GE's solar-energy and water filtration technologies, Dynoil will install the units in remote and rural areas throughout India, Bangladesh, Nepal, Malaysia and Africa.

# Pending Renewable Energy Transactions

## *Andrew Kurth's pending transactions:*

- Ecron Corporation – 6 X 110 million gallons/yr (330,000 mt/yr) Fuel Ethanol Facility to be constructed in Baltimore, Maryland on a project finance basis – will be the largest facility in the U.S.
- Space Island Group
  - Development of solar-powered satellites to transmit radio frequency beams from a geostationary orbit to earth-based receiving terminals to be located in India for the AC conversion of these beams into useable electric power.
- Nuclear Solutions, Inc. – 200 million gallons/yr GTL (700,000 mt/yr) facility to be constructed on tribal land of the Otoe – Missouri Tribe in Oklahoma on a project finance basis.
- Each of these projects have multiple strategic investors, private equity and venture capital investing into the equity component of the financed project.

# Kreido Biofuels Business Update

Three biodiesel plants in development with anticipated nameplate capacity of 100 million gallons/yr (333,000 mt/yr) to be operational in 2008.

## Status of Proposed Kreido Plants

- Negotiating with multiple liquids handling partners to finalize parcel leases and tolling fees for liquids bulk handling and use of terminal infrastructures
- Finalizing site-specific off-take agreements with diesel blenders; all blenders are in close proximity to the sites and currently purchase biodiesel
- In discussions with onshore and offshore feedstock providers
- In discussions with potential offshore licensees
- Will begin training personnel in systems operations June 2007  
*(Foothills Bio-Energies, North Carolina)*