Green Practices Commission
6801 Delmar Boulevard, University City, Missouri 63130, Phone: (314) 862-6767, Fax: (314) 863-9146

Meeting Minutes – University City Green Practices Commission

March 10, 2016

Location:	Heman Park Community Center
Attendees Present:	Dianne Benjamin, Bob Elgin, Tim Michels, Jeff Mishkin, Steve Kraft (Council Liaison), Jenny Wendt (Staff Liaison)
Absent:	Richard Juang, Scott Eidson, Lois Sechrist
Guests:	Tom Dunne and Gary Brinkmann, Sebright Industries Kathleen Beebe and Debra Pottinger, Ameren PurePower Bob Henkel, Program Director, St. Louis Earth Day

1. Meeting called to Order, Roll Call at 6:05 p.m.

2. Opening Round
   a) Tim will be attending a meeting April 11 – 12 in Columbia about Advancing Renewables in the Midwest.
   b) Bob discussed the email he sent about Ameren's "21st Century Grid Modernization and Security Act" presentation that was held to convey the need to upgrade the grid.
   c) Jenny announced she was working with Emily Andrews through the US Green Building Council – Missouri Gateway Chapter to hire an intern, who will perform the Greenhouse Gas Inventory to comply with requirements for the Compact of Mayors.

3. Approval of Minutes
   a) February 11, 2016 Meeting Minutes were agreed upon with no amendments. There was no quorum at the March 10 meeting so approval will be tabled until the April 14 meeting.

4. Special Presentations
   a) Ameren Pure Power – Kathleen Beebe, Debra Pottinger
      i. In the EPA Green Power Community program, a city commits to meeting a minimum percentage of their annual electricity use with green power. This can be accomplished with the purchase of Green-e certified Renewable Energy Certificates (RECs), as well as by installing on-site solar power. In St. Louis, the program is partnered with Ameren's Pure Power program and Microgrid Energy.
      ii. Creve Coeur and Maplewood are the cities in the St. Louis area which have completed the program. Clayton completed the program a few years ago but has not participated lately.
      iii. See attached for detailed information.

   b) Waste to Energy – Tom Dunne and Gary Brinkmann
      i. Gary Brinkmann represents Sebright Industries, which is a company specializing in waste and recycling equipment. Sebright is partnering with Tom Dunne, former CEO of Fred Weber Inc. to create a waste to energy plant.
      ii. Gary and Tom are determining if St. Louis is a good market for this plant and are asking for letters of intent from cities.
      iii. University City could benefit from a 20% reduction in landfill fees. If the City agrees, an agreement to lock in the rate and number of years would be negotiated.

iv. In late April, Gary would like to schedule a tour of a partially-functional plant in Chicago IL.
v. See attached for detailed information.

5. New Business
   a) Proposed Solar Installations
      i. Tim developed a solar installation proposal for several University City buildings including Firehouses 1 and 2, Centennial Commons, Library, and possibly the maintenance yard structure.
      ii. Tim suggested that the City create a private/public partnership to provide financial assistance as well as possibly using the PACE program.
      iii. Tim will develop a more detailed proposal of a small project to clearly indicate how funding would work for the City.
   b) Finalizing Goals and Sub-Committee Designations – TABLED
   c) April Council Meeting and Study Session – TABLED
   d) Parks Foundation:
      i. Jenny attended a Parks Foundation Meeting to discuss projects that can be coordinated with the GPC.
      ii. The Majerus Park Master Plan is underway, Fogerty Park Design and Construction is also beginning soon.
      iii. The Parks Foundation is eager to provide funding and assistance to the parks projects.
      iv. Persimmon, paw paw and pecan trees are planned for Millar Park.
      v. Jenny will continue communicating with the Parks Foundation on parks projects.

6. Old Business – NONE

7. Reports – NONE

8. Closing Round – NONE

9. Meeting adjourned at 7:36pm

EPA Green Power Community (GPC) Challenge Overview

University City, Missouri

Objective: City commits to pursuing the EPA Green Power Community designation.

Purpose: Challenge communities to purchase clean energy in an amount that meets EPA benchmarks, motivate collective action and reward communities that show leadership.

History of GPC Challenge in Missouri

1. 2011: **Clayton** becomes first EPA GPC in MO
2. 2013: **Creve Cœur** becomes an EPA GPC
3. 2014: **Webster Groves** becomes an EPA GPC
4. 2015: **Maplewood** becomes an EPA GPC

Green Power Community street sign presented to the City of Webster Groves by the EPA

Green Power Community Sign

- Highlights a successful campaign
  - Each Community receives two 24″ x 30″ aluminum signs
  - Designed for outdoor display
- Other Recognition
  - Artwork for Community Banner
  - Press Release Assistance
  - Listing on EPA website

Oregon's Governor Kulongowski and EPA's Matt Clouse holding a Green Power Community sign

Event Banners: EPA can provide artwork development services to produce banners for announcement events.

What Counts Towards Target?

1. **Purchase Renewable Energy Certificates** (RECs) from Pure Power, or any other REC provider (must be Green-e certified RECs).
   - This option is much cheaper currently…
2. **Install onsite solar power**, from Microgrid Solar or any other solar installer.

Includes all commercial and residential power users.

Renewable Energy Certificate (REC)

- Proof that one megawatt-hour (MWh) of renewable electricity was generated by an “eligible” renewable energy resource
  - Each REC embodies the renewable energy attributes (environmental and social) associated with the generation of power from that resource
- RECs bolster the renewable energy market

Ameren Pure Power

- The program allows utility customers to support renewable energy through the purchase of Renewable Energy Certificates (RECs)
  - The program is available to residential and business customers. Business customers range from the small independently owned to large commercial entities like Mercy hospital.
- Pure Power program also qualifies for points under the LEED Green Power Credit

PurePower
Powered by Ameren Missouri

3Degrees

EPA GPC Requirements - #1

City itself becomes a Green Power Partner

- University City purchases RECs at Gold Leader level (EPA Green Power Partner level)

Annual Electricity Usage for City Facilities: 5,503,517 kWh

Green Power Partnership Requirement = 10% = 5,504 MWh = 46 Blocks/ month or 552 Blocks (RECs) / year

Original Option: Ameren Missouri Pure Power Only

46 blocks/ month * $10 / block **= $460 / month or $5,520 /year**

New Hybrid Option: Hybrid of Pure Power and 3Degrees US Green Power RECs

5 blocks of MO Pure Power ($10 each) = $50 /month or $600 / year

41 blocks of US Green Power Recs ($1.50 each) = $738 / year

New Hybrid Option cost**: $1,338 / year** **THIS NEW PLAN IS 75% CHEAPER**

- City is already collecting Utility taxes on existing Pure Power enrollments, and the additional enrollments that would be added during the Challenge would likely cover the direct cost for the City to become an EPA Green Power Partner.

EPA GPC Requirements - #1

- The Hybrid proposal is to buy 5 blocks (RECs) per month from Pure Power to support the local program and receive local recognition
  - Ameren Missouri Pure Power Supports the development of 100% Missouri Wind Power, no contract required. The monthly cost is added to existing Ameren account

- The other 41 blocks are 3Degrees US Green Power RECS. These are national RECs for any US located facility, using any type of renewable energy. There is an annual contract and prices can vary annually.

EPA GPC Requirements - #2

Commit to and initiate a public EPA GPC Challenge campaign.

- Mayoral Proclamation
- Or Vote by Board of Alderman
- Or Press Release

EPA GPC Requirements - #3

Achieve University City's specific challenge target:

3% of total power consumed City-wide from green power purchases or onsite production.

- Based on current enrollment in Pure Power, University City is already well on the way to achieving the goal.
- Total power consumed includes Commercial, Institutional, Industrial & Residential Power Usage

Is it Achievable ?

- Annual Usage of University City including Government, Business, Institutional and Residential: 316,757,846 kWh
- 3% Goal= 9,502,736 kWh = 9,503MWh/ 12 months = 792 Blocks (MWh) per month
- Current participation: Ameren Missouri Pure Power = 203 Blocks (MWh) per month. With City Participation: 249 Blocks per month

  Total needed to qualify = 543 MWh.
- This equates to getting approximately **254 Households and 67 businesses to participate**. (Actual mix of households and residents could vary).

Environmental Benefits

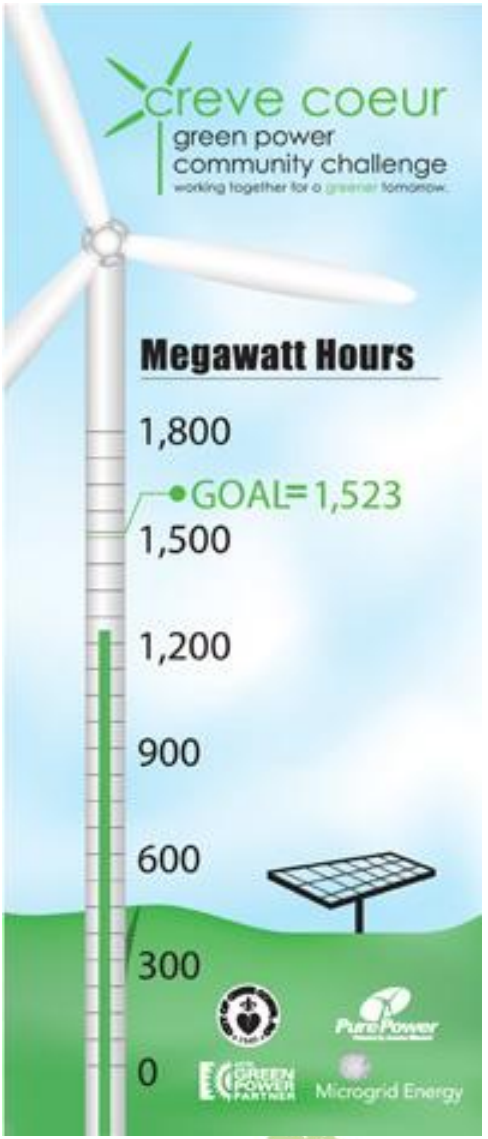
With the achievement of a 3% green power purchasing level, the City of University City will reduce the city's carbon footprint by 16,342,119 pounds of carbon dioxide, a leading greenhouse gas. This is the same environmental benefit provided by taking 1,560 cars off the road each year.

3 Degrees Liason:

Debra Pottinger
3Degrees Inc.
Debrap@3degreesinc.com
314.740.4130

How 3Degrees will spread the word:

- City communication vehicles (newsletters/website)
- 2 Main Events – Kick-Off & Celebration
- Integrate with existing City events
- Media work
- Online presence
- Solicit large power users directly
- Direct mail



Waste Conversion Systems with Proven Capabilities

WHERE ARE WE NOW?

- **Incineration**
  - Hard to permit
  - Inefficient operation
- **Plasma Arc**
  - Unproven
  - High parasitic load
- **Pyrolysis**
  - Low emmisions
  - Low parasitic load
- **Waste to fuel**
  - Easy to permit
  - High payback

WHY HAS PYROLYSIS AND WASTE TO FUEL NOT TAKEN OFF?

- **Actually it has**
  - **Single source material facilities are in operation for both technologies**
- **Why not for MSW?**
  - **No efficient way has been developed to prepare the material for processing**

UNTIL NOW
Solutions Provided

Sebright Products Inc. will provide a system using proven and tested equipment that solve all of these issues.

- Homogenous and consistent material √
- Consistent moisture content √
- Inert materials removed √

This system also provides:

- Full Systems Integration of components
- Lowest maintenance costs in the industry
- Lowest downtime in the industry
- Lowest operating costs in the industry

Patented Sebright Products VSI (Vertical Shaft Impactor)

Turns this

Into this

Patented PAD System dries the feedstock

Turning wet materials into dry feedstock

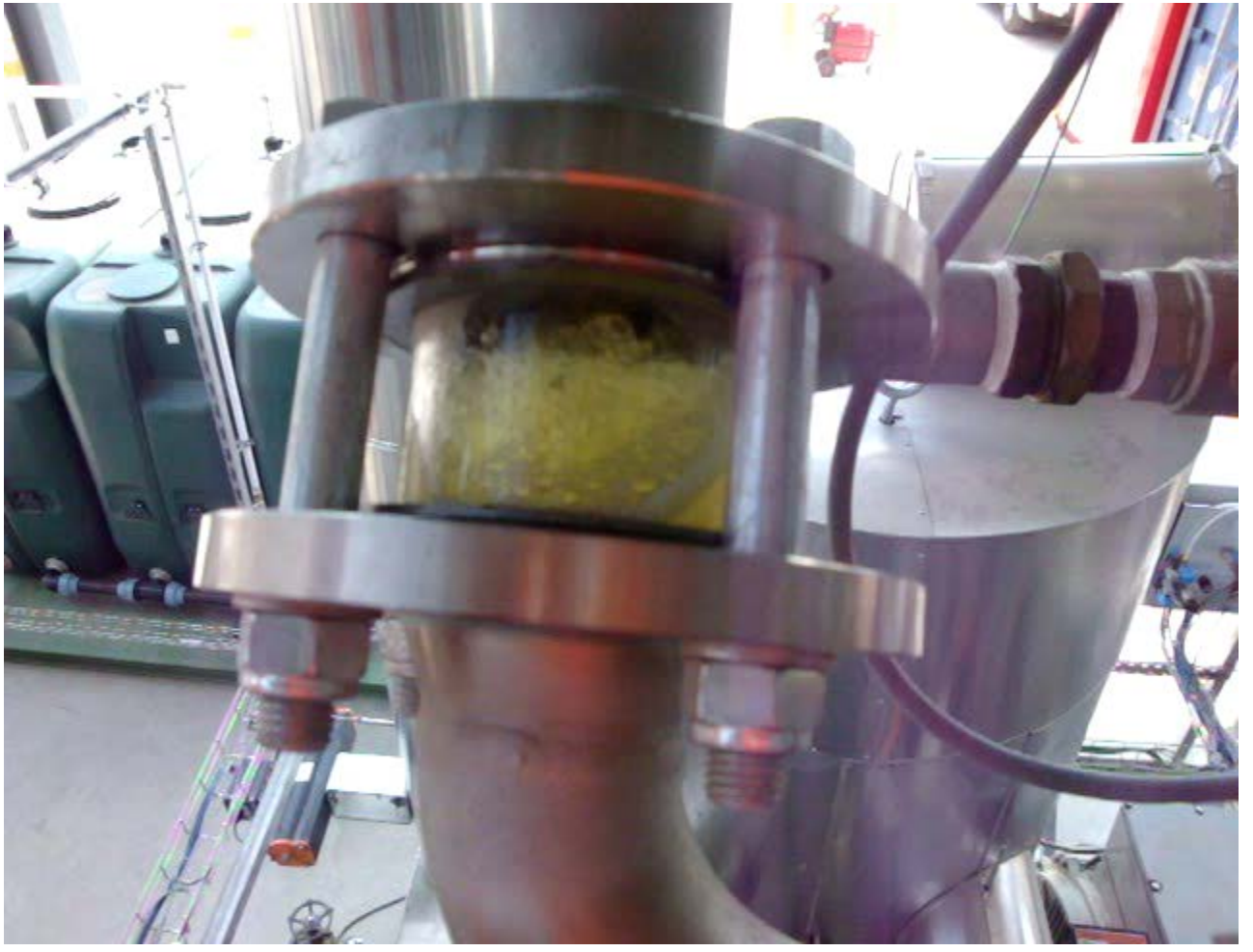
Human Biosolids Sludge

Homogenous dried feedstock from the waste can be converted into one of two different energy forms.

Syngas to electricity

Or diesel fuel production

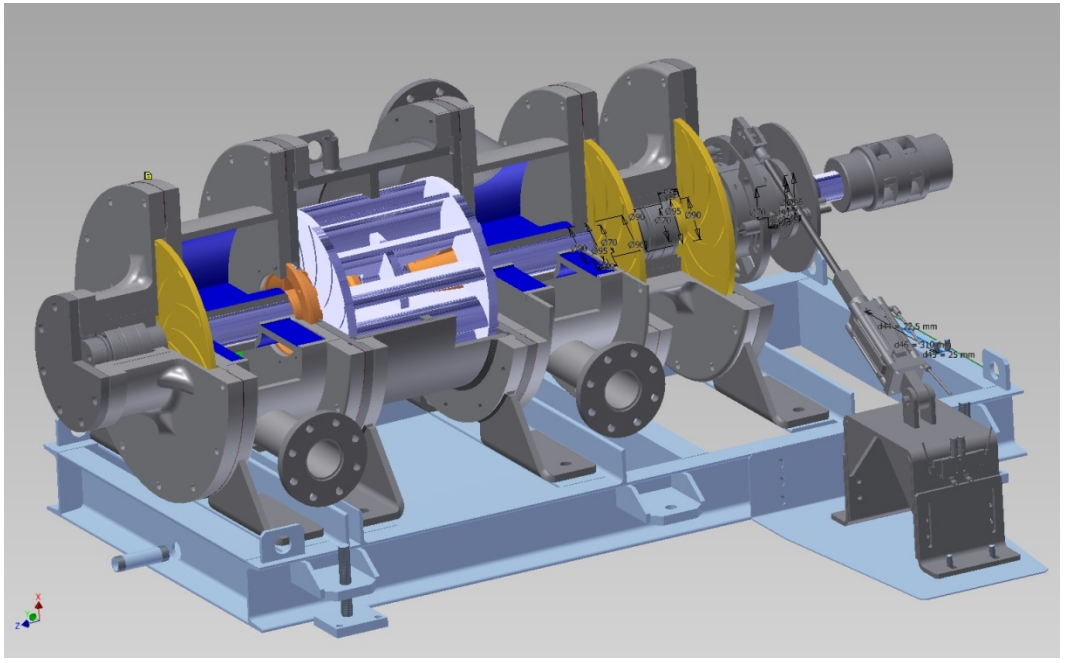
Renewable Diesel - Created from Biomass with Advanced Biofuel Technology



Alphakat Catalytic Depolymerization (KDV) Key Technical Issues

- Siemens in Germany developed unique catalyst 35 years ago
- Alphakat purchased technology from Siemens 10 years ago
- Proprietary, patented, improved catalyst and the conversion system developed by Alphakat has been the key to commercialization
- Conversion occurs in high energy, fluidized reaction chamber (Turbine)
- Catalyst reduces depolymerization temperature to as low as 240^{o} C
- Pressure is near atmospheric (minus 1.5 psi to minus 3 psi)
- No toxic emissions - No furans, halogens or dioxins are created – only H_2O & CO_2

Conversion Occurs Because:



- Catalyst in fluidized reaction chamber breaks long chain molecules into short chain hydrocarbons at low temperatures and low pressure
- Small size material shredding (1 to 5 mm pieces)
- High agitation fluids in the reaction chamber
- Temperature controlled by friction created in the reaction chamber

Our Project is an Advanced Biofuel Biomass to Renewable Diesel Facility

Feedstock

Biomass to Renewable Fuel Facility

Catalyst Depolymerization

Energy Products

Poland Biofuel Facility

KDV 1000 – Poland Location
Our Standard System

Common Feedstock Used to Make Biofuels and Renewable Fuels

Transesterification (Simple Technology)

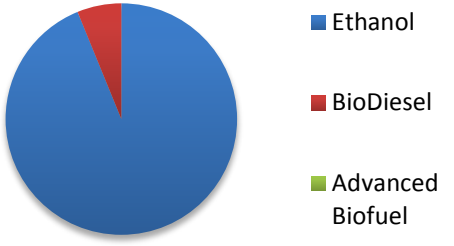
- Fats, Oils, Grease
  - Used cooking oil
  - Animal rendering plants
- Oil bearing crops
  - Rapeseed, Soybeans, Flax
  - Sunflower, Palm oil, Peanut
  - Jatropha
  - Algae

Advanced Biofuel Technologies

- Waste biomass materials
  - Wood waste
  - Green biomass
  - Agriculture waste
- Manure and Biosolids
- MSW

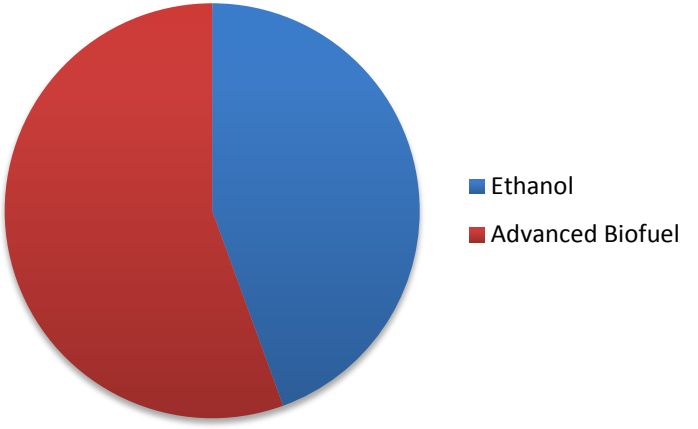
Biofuel Requirements
Advanced Biofuel – Grows Most

- 2012 Biofuel Production
  - 13.3 Billion Gallons Ethanol
  - 1 Billion Gallons BioDiesel



- 14.3 Billion Gallons

- 2022 RFS Biofuel Goals
  - 15 Billion Gallons Ethanol
  - 21 Billion Gallons Advanced Biofuels



- 36 Billion Gallons

WASTE TO FUEL

Feedstock is unloaded inside the building

Feedstock is placed into Initial Shredder (8”-12” minus)

Metals removal

VSI processing

PAD System

Waste to fuel system

Fuel transfer station

Sold to end users

Grey water

Carbon Ash fuel for kilns

Estimated cost gallon
$1.08 to $1.70

KDV Technology

Zero emission technology
(only CO_2 and H_2O)

Negative pressure system

Electric heaters for carrier oil

Electric mixing turbines

Diesel fuel production from feedstock

Non-condensable hydrocarbons
Are converted to CO_2 and H_2O
In an SCR

Facility Scaled for Future Expansion

Alphakat Catalyst Depolymerization Conversion Rates

- Waste Plastics
  BTU value of 19,000 → 200 Gallons Petroleum Diesel
- Sorted MSW
  BTU value of 9,500 → 130 Gallons Renewable Diesel
- Various Biomass
  BTU value of 7,500 → 100 Gallons Renewable Diesel

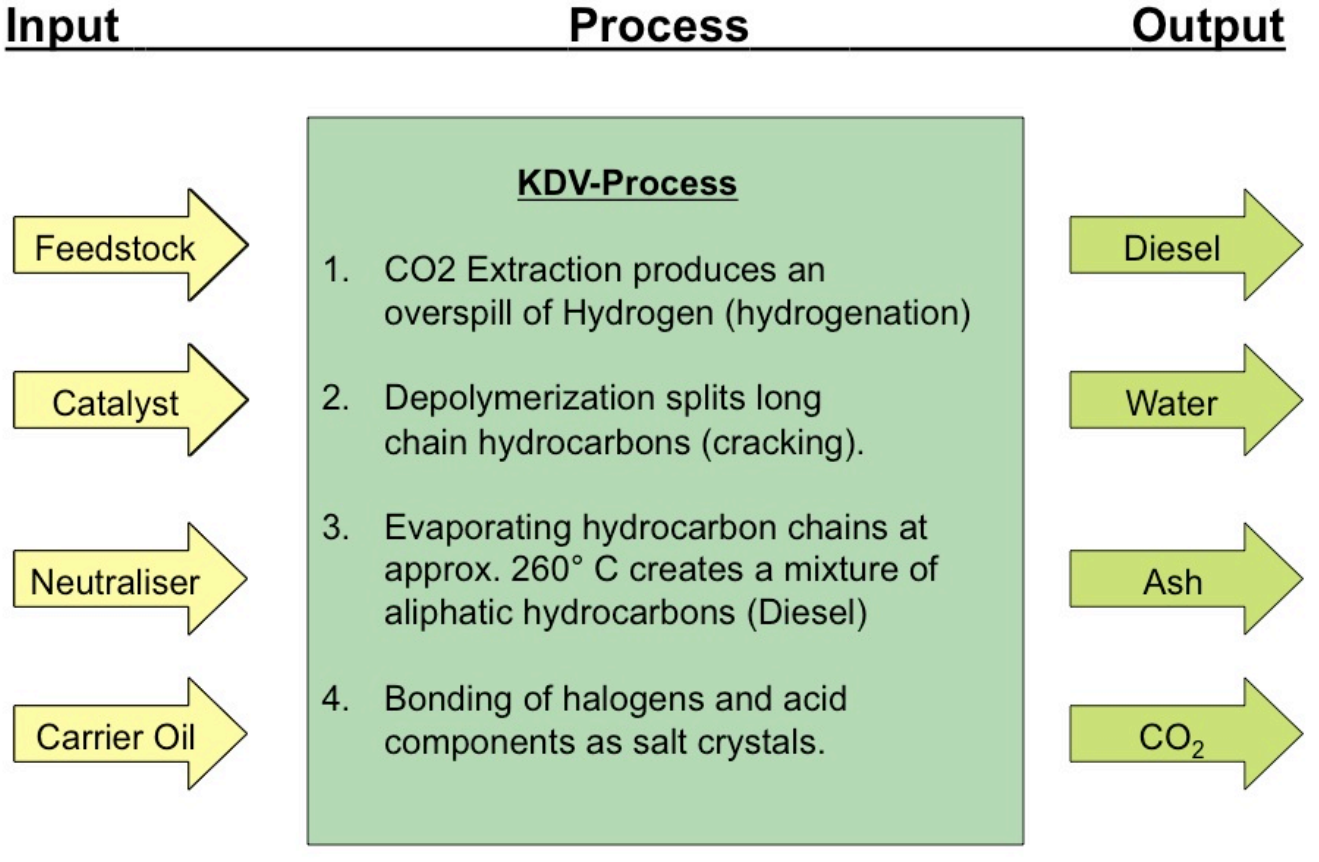
Conversions are per US Short Ton of waste material listed
Conversion numbers are Gross quantities, without any parasitic consumption

Above Ground Fuel Tanks

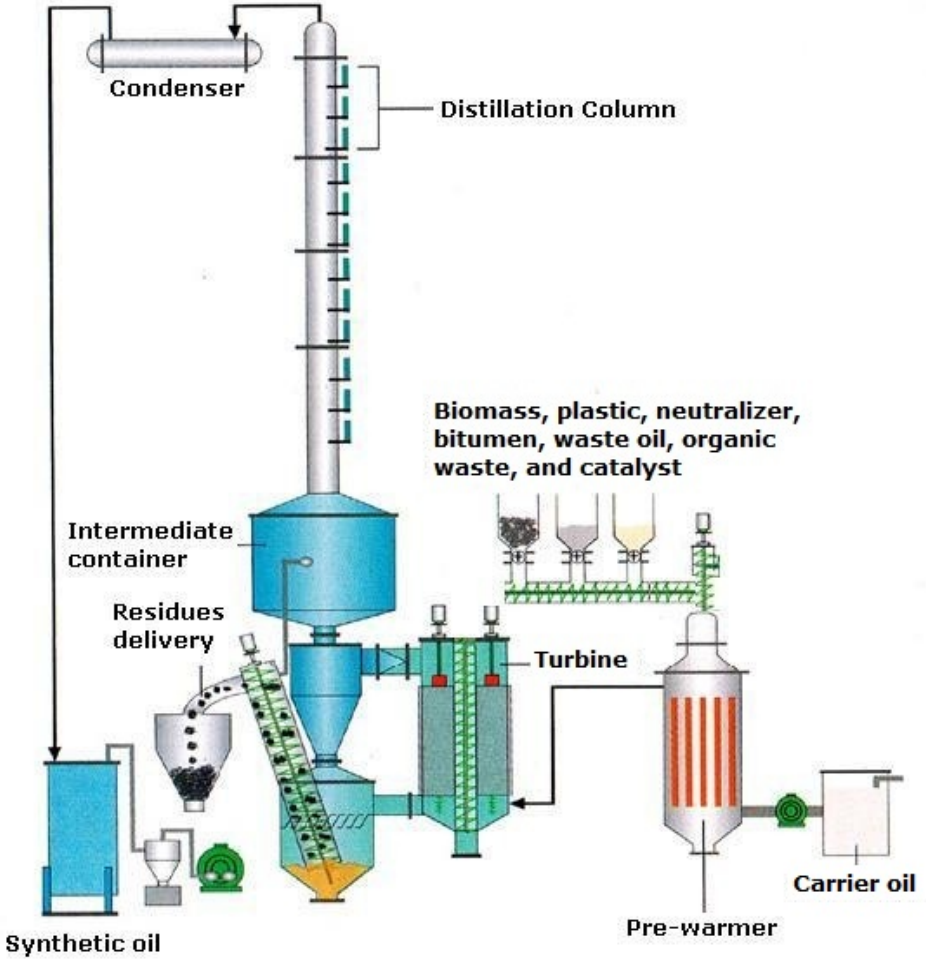
Double Walled Tanks & Monitors – Serve as Dike for Leaks and Fire Protection

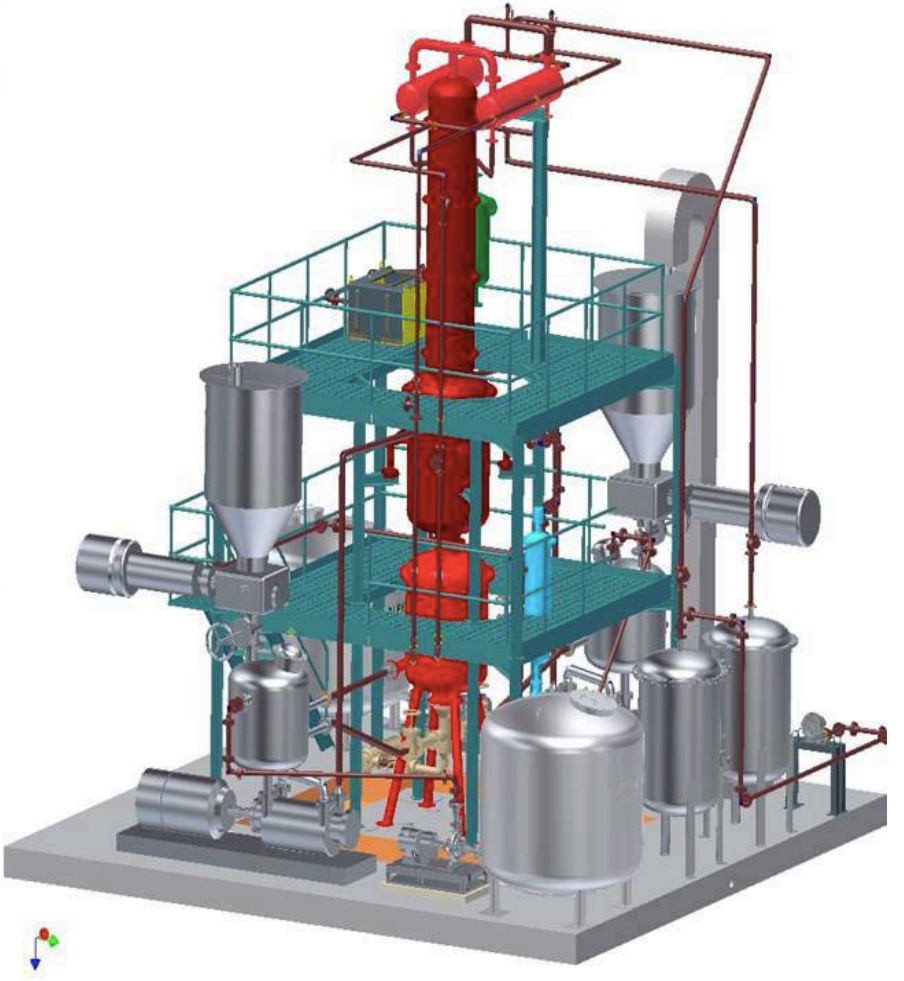
Fuel Blending and Custody Transfer of Fuel to Trucks

KDV – Inputs and Outputs



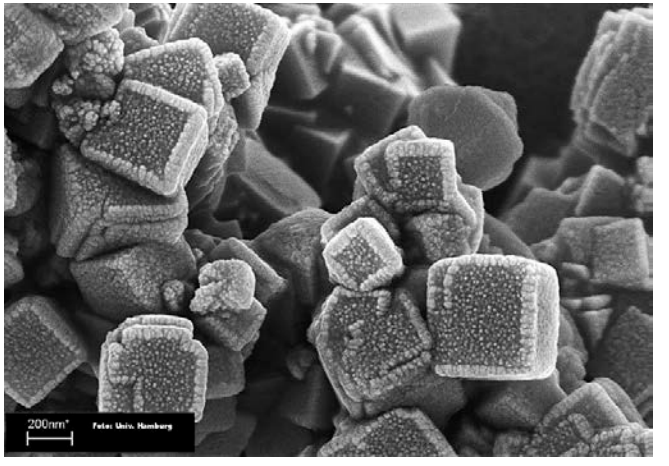
KDV System Process Graphic





Catalyst

- Patented by Alphakat
- Crystalline shape
- A Zeolite catalyst
- Aluminum Silicate material
- Causes depolymerization with high agitation, no pressure, and hydrocarbons are produced at under 300^{o} C
- Combines with heavy metals on a molecular basis to form salts
- Non-leachable/insoluble ash is formed as the catalyst combines with the heavy metals



Fuel Characteristics

- Meets specification (ASTM D975) for transportation grade #1 or #2 Ultra-Low Sulfur Diesel fuel (No.2-D S15)
- Exceeds characteristics that make it a Premium Diesel
  - Cetane number (40 min required) this fuel typically exceeds 58
  - Higher BTU value
    - Petroleum Diesel is 120,000 to 140,000 BTU/gallon
    - BioDiesel has 110,000 to 130,000 BTU/gallon
    - Alphakat Diesel has tested between 130,000 and 155,000 BTU/gallon
  - Very low aromatics – less smoke, and cleaner burning fuel, lower PM-10 and PM-2.5 emissions
  - Lubricity of 255 versus 520 (520 is the max specified value)
  - Ultra low sulfur rating well near 0 PPM

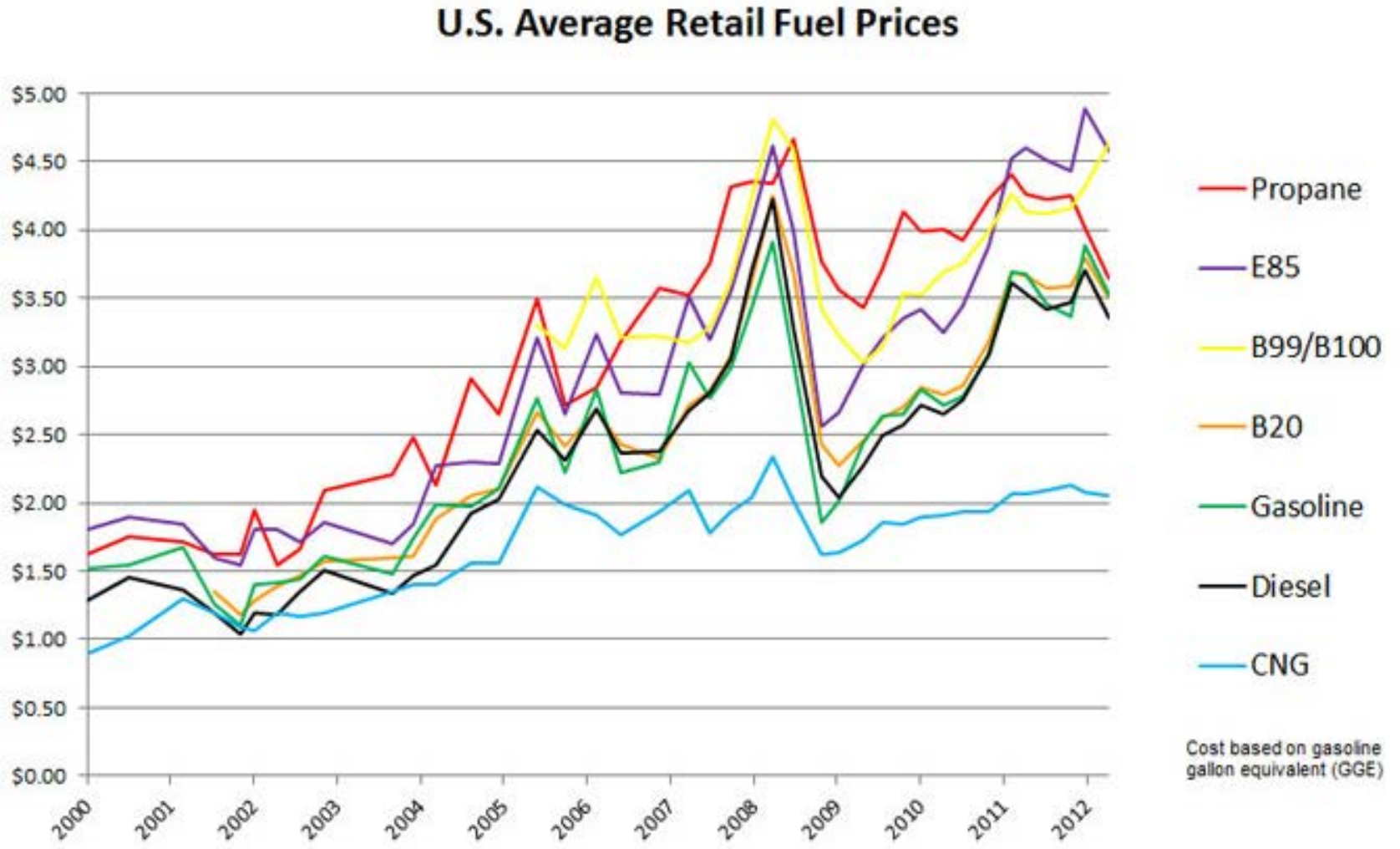
Fuel Qualities – D975

Specified Items	Measurement Units	ASTM D 4054 *New Aviation Turbine Fuels*	ASTM D 975 No. 1-D *Diesel fuel*	ASTM D 975 No. 2-D *Diesel fuel*	Test Results	#1	#2	Comments
Cetane Number	Minimum Number	N/A	40	40	47.8	✔	✔	
Cetane Index	Minimum Index	N/A	40	40	47.3	✔	✔	
Aromaticity	Maximum % Weight	25	35	35	15.4	✔	✔	
Physical Distillation Temperature	^{O}C @ 90% Volume Recovered	Min - 150 Max - 262	Min - none Max - 288	Min - 282 Max - 338	280.1	✔	✖	Increase KDV Temp
Kinematic Viscosity @ 40^{O} Celsius	mm^{2}/s (cSt) @ 40^{O}C	Min - N/A Max - 8.0 (@-20^{O}C)	Min - 1.3 Max - 2.4	Min - 1.9 Max - 4.1	2.011	✔	✔	
Flashpoint	Minimum ^{O}C	38 min 68 max	38	52	50.5	✔	✖	Increase KDV Temp
Ramsbottom carbon residue 10% distillation	Maximum % by mass	N/A	0.15	0.35	0.14	✔	✔	
Ash	Maximum % by mass	N/A	0.01	0.01	0.001	✔	✔	
Water & Sediment	Maximum % by Volume	0.05 500 PPM	0.05 500 PPM	0.05 500 PPM	0.0231 231 PPM	✔	✔	
Lubricity	HFRR @60^{O}C Maximum Microns	850	520	520	264	✔	✔	
Copper Strip Corrosion	Maximum number	No. 1	No. 3	No. 3	No. 1a	✔	✔	
Conductivity	Minimum Micro-S/m	85	25	25	460	✔	✔	

Diesel Specifications

Historical Fuel Prices

BioDiesel is typically $1.00 Higher than Petroleum Diesel



How Blended Fuel Makes it's Way into Fuel Tanks

Fuel Manufacturers
Sell Fuel - Wholesale

Petroleum Refineries

Ethanol, Biodiesel
Renewable Biofuel
Manufacturers

Distributors pick up Fuel
Blend, mark up, and resell
Fuel to Retail Stations

Most Distributors are
Independents, some
Are Big Oil Owned

Retail Fuel Outlets
Sell Blended Fuels
To Retail Customers

Common Blended Fuels
BioDiesel – B5, B20, B100
Ethanol – E10, E15, E85

Benefits of Alphakat Technology

- Second generation Biofuel technology – Also called Advanced Biofuel Technology – Creates Renewable Diesel fuel from renewable feedstock sources – Also called "Drop-In-Diesel" fuel
- Same system will convert all kinds of biomass feedstock, industrial wastes, and other feedstock materials considered wastes
- Zero emissions – except for CO_2 and H_2O – no exhaust smoke stack – all electrically heated
- Sulfur or chlorinated materials are harmlessly combined with the neutralizer or catalyst to form non-leachable salts and pulled out with our ash
- Lowest cost to convert feedstock to "Drop-In-Diesel" fuel
- Small, medium and large size conversion systems are available
- Key technologies were developed over the last 35 years and commercialized in Europe
- 30 year system design life
- Excellent profit margins, ROI, and payback for the investor

BENEFITS

- Waste to Fuel is a Safe, Simple & Efficient waste treatment process that substantially reduces the weighted volume of waste by more than 90%, remainder can be used in other applications.
- Complete Destruction of Waste Pollutants Including PCB's
- Very Low Emissions that exceed the Highest US Air Standards
- Reduces use of Fossil Fuels
- Decreases Methane Emissions
- Extends Life of Local Landfills
- Reduces Risk of Groundwater Contamination from Landfills
- Enhances Existing Recycling Programs
- Reduces Tipping Fees
- Environmentally Responsible

CONVERSION TECHNOLOGIES

Accepted Materials

Municipal Solid Waste
- Common household and commercial trash diverted from landfill sites at contracted tipping fees.

Automobile fluff.
- Remains of a shredded car with metals removed

Coated papers are non-recyclable
- i.e. sticker back paper

Wax lined or contaminated cardboard

Multi-layer plastics (ie food packaging)
- Contamination with food residue is OK

Plastic lined paper ingredient bags or seed bags with moisture barrier.

Out of date crop seed in the bag.

Tires
- Requires additional front end processing equipment

Shingles
- Requires additional front end processing equipment

Scrap filter papers

Animal and or Human Waste
- Lagoon waste from large livestock operations
- Human waste from sewage treatment facilities
- Material must be dried to 30% moisture or less

Wood waste

CONVERSION TECHNOLOGIES

Contact:

Gary Brinkmann
(319) 389-5444 direct
gary@sebrightproducts.com