#### Wendy Briggs

| From:    | Robert Fazzini <robert.fazzini@gmail.com></robert.fazzini@gmail.com> |
|----------|--|
| Sent:    | Tuesday, January 01, 2013 10:24 AM                                   |
| Cc:      | 'Robert Fazzini'   |
| Subject: | Ward 8 Report - December 2012  |

#### INTRODUCTORY COMMENTARY:

During the month of December my city council activities amounted to 68 hours. For the year of 2012 my city council activities amounted to an average of 65.6 hours per month. This is close to what I anticipated when I decided to campaign for the office of alderman in ward 8. It is very close to the amount of time I devoted as President of the McLean County Chamber of Commerce several years ago. In both situations I have thoroughly enjoyed spending the time to help citizens with particular issues and helping the city by participating in the policy making role as an alderman. The learning process concerning how the city operates has been both educational and exhilarating, and I very much appreciate the opportunity to serve.

I especially enjoy the opportunities to substitute for the Mayor when he is not available as I did on 12-15-12 Wreath Across America Ceremony where State Senator Bill Brady and I were each asked to make remarks during the ceremony honoring our war veterans.

The three citizens' concerns in which I was asked to be involved in December brought the total for 2012 to 54.

#### COMMUNITY INVOLVEMENT:

- 1. Marched in the Jaycees Annual Christmas Parade representing the City of Bloomington along with three other aldermen.
- 2. Met with a citizen by his request to discuss his ideas regarding a business venture he is considering upon retirement. People continuing to be active after "official" retirement is a special interest of mine, and it is a way for our community to prosper by taking advantage of talent. Our community was recently recognized as one of the top 25 communities in the country for people to retire and continue to contribute by volunteering and/or working in an area of personal passion in post-retirement.
- 3. Met with two other aldermen over lunch to discuss current topics under discussion by the city council as well as topics that perhaps should be topics of discussion by our city council.
- 4. Met with the Executive Director and President Elect of the McLean County Museum of History as the current President to plan the agenda for the Executive Committee meeting.
- 5. Met with City Manager, David Hales, to discuss several city council related issues of mutual interest.
- 6. Met with a group of six citizens to gather input regarding topics currently being considered by our city council.
- 7. Attended with Lynne a reception hosted by Business Furniture in downtown Bloomington.
- 8. Chaired the McLean County Museum of History Executive Committee monthly meeting.
- 9. Met with a local bank President to learn opinions regarding several issues currently being discussed by city council.
- 10. Met with representatives from the ISU Library to learn more about our community history with the Circus and its famous performers trained or from Bloomington.
- 11. Attended with Lynne the Commerce Bank annual holiday reception at Bloomington Country Club.
- 12. Attended with Lynne the IWU annual holiday reception of our alma mater at President Wilson's home.
- 13. Attended with Lynne the annual holiday reception hosted by Greg and Carol Koos for the board and staff of the McLean County Museum of History.
- 14. Had dinner with Lynne and a representative of Governor Quinn's staff to discuss state level issues that could affect the Bloomington City Council.
- 15. Attended the Multi-Cultural Leadership Program mid-term project presentations.
- 16. Attended the ISU Senior Professionals board meeting.
- 17. Attended two city council meetings, one city council work session, two city council executive session and Bloomington Township meeting.
- 18. Substituted for Mayor Stockton to make a presentation at the annual Wreath Across America Ceremony.
- 19. Attended the first Alderman Committee meeting for Administration and Finance issues.
- 20. Attended with Lynne the annual Economic Development Council holiday reception.
- 21. Attended the quarterly luncheon "BN by the Numbers" sponsored by Central Illinois Regional Airport.
- 22. Attended with Lynne a presentation by Muralist Joel Bergner to learn more about his efforts to merge education and painting of murals in many third world countries with emphasis on how children benefit from participating in painting

the murals. I will continue to explore ways to significantly increase ways to encourage building owners to "dress up" their buildings by having murals painted. Having an artist like Joel Bergner involved could help generate some enthusiasm.

23. Met with Illinois Representative Dan Brady to discuss an exciting project that will involve collaboration of the following entities if it can be successfully completed: McLean County Museum of History, McLean County Board, Central Illinois Regional Airport, Convention and Visitors' Bureau, City of Bloomington, State of Illinois and possibly other entities once the project is successfully launched.

Note: You will notice that Lynne accompanied me on numerous occasions. I consider her participation an important aspect of helping me represent the City of Bloomington at various events. That is why I indicate when she attends events with me.

#### VOTING ON MAJOR ISSUES:

December 10, 2012 meeting: There were seven items on the Consent Agenda which passed unanimously. The Regular Agenda contained five items. The Six Month Finance Report and the Paradigm Presentation regarding Waste to Jet Fuel Development were presentations that did not require a vote. Both presentations were of high quality. The other three items were approved unanimously. During the Alderman Comment portion of the meeting, I proposed that the Bloomington City Council consider marching in joint community parades with the folks from the Normal Town Council. Most such parades have only three or four representatives from each council. Doing this together would show both communities a level of cooperation that should exist between the councils.

December 17, 2012 meeting: There were nine items on the Consent Agenda which passed unanimously. There were five items on the Regular Agenda of which four passed unanimously. The one item that did not pass unanimously related to Electricity Aggregation being place on the April 9, 2013 ballot for citizens to decide whether or not they want to have the City of Bloomington pursue the opportunity for each citizen to save approximately \$200 or more annually with no possibility of paying more than the current provider arrangement. Further, no citizen would be required to participate because there is an opt out option for any citizen to exercise. Based on the facts presented, seven of us voted to place the issue on the April 9, 2013 ballot while two aldermen vote not to place the issue on the ballot (Purcell and Stearns).

#### COMMUNITY HISTORY:

Last month this section was entitled CONCLUDING COMMENTS as it has been for several months. Since this is the last Ward 8 Report for 2012, I decided to provide you with a review of a book that I just finished reading entitled: PAGES FROM THE PAST by Bill Kemp who is the Librarian for the McLean County Museum of History. The book includes 75 of the nearly 360 articles Bill Kemp has written since 2005 that have appeared in The Pantagraph on Sundays.

Let me share two reviews of the book. First, Al Bowman, President, Illinois State University said: "Bill's crisp and creative storytelling brings to life the good, the bad, and sometimes the ugly of McLean County's history. Each story, along with its accompanying photo, highlights important individuals and events that have helped make our community what it is today. With this anthology, Bill serves up a literary treat for area residents or anyone who is interested in the history of Illinois's largest county. Bill's Pages from the Past is a testament to our rich heritage." Second, from my friend with the quirky sense of humor, Columnist, Bill Flick, who wrote: "Bill Kemp's stories on the Central Illinois Past? That's the very first thing I read in the Sunday Pantagraph .... Well, OK, maybe the second."

I found the book so interesting that our relatives living in McLean County were each given a signed copy of the book as a Christmas present. The book cost is only \$10 and it can be purchased at: McLean County Museum of History, Garlic Press, Casey's, Beer Nuts stores, DBA office, Babbit Books, The Pantagraph, McLean County Art Center, and the David Davis museum.

Even my 94 year old mother-in-law who has lived most of her life in McLean County said that she learned some things that she was unaware of about our community. For example, did you know that:

- 1. In the war of 1812 that our kickapoo Indians served as shock troops for the pro-British Native American alliance led by arguably the greatest Indian Chief ever, Tecumsah?
- 2. The State of Illinois legislature established McLean County on Christmas Day in 1830?
- 3. The two most important reasons Bloomington grew as a town where the coming of the railroad in 1853 and the Telegraph in 1854.

- 4. On May 29, 1856 Abraham Lincoln delivered a speech in Bloomington that has been called the greatest speech of his career sharing his reasons for his opposition to slavery. The audience was so mesmerized that no one took notes, and it became known as Lincoln's Lost Speech.
- 5. There has been only one recorded lynching in the history of McLean County. The horse thief named Charles Pierce, who murdered the jailer in his escape, was caught and hanged by an angry mob on October 1, 1881.
- 6. The unequaled of record of 59 major league victories in one season was established in 1884 by pitcher Charles "old Hoss" Radbourn who was born in Bloomington. He completed every one of his 73 starts that year.
- 7. Captain Julius C. Witherspoon was the first black officer to lead the "all colored" 8<sup>th</sup> Regiment Illinois United States Volunteers in the Spanish-American War.
- 8. The typhoid epidemic in Bloomington in the 1920s spread because of unsafe drinking water, which led to the creation of Lake Bloomington in 1929/1930.
- 9. Before Charles Lindbergh made his famous New York to Paris journey in the single-engine monoplane Spirit of St. Louis in 1927, he managed to make an unintended landing (a crash in non-airline parlance) in Covell (just about 10 miles west of Bloomington) while delivering mail from St. Louis to Chicago. Flying blind at night and out of fuel he parachuted at 13,000 feet and landed in the Covell confield.
- 10. The Pantagraph had an airplane, Scoop, which took aerial photographs from 1929 to 1941 giving The Pantagraph the distinction of running more aerial photos than any other newspaper in the world.

The book is full of many more such facts. This is a must read for any citizen of McLean County. Buy and enjoy!

#### Robert B. Fazzini

#### Wendy Briggs

From: Sent: Cc: Subject: Bruce Meeks Thursday, February 21, 2013 12:55 PM Alex McElroy; Robin Weaver Waste Disposal - Twin Cities

Dear Alex and Robin,

This email is about discussing the waste disposal for both cities in the future. Clearly we know that the local landfill will be full by May 2016 unless the waste is taken to for example - Pontiac and Clinton. Which may be already occurring and thus less utilization of the local landfill which might extend it's life.

My questions are probably already been asked and answered by yourselves and others. So pardon me for not having all the knowledge on this topic. These are my offering of open and transparent questions to add to the discussion.

This email does focus on Waste to Energy which on purpose is **not** about which design, process or what kind of energy would be produced. (*i.e. - syngas, thermal, liquid, steam, bioreactor, algae*)

Clearly this particular discussion is focused on the **cash** cost of any alternative to the municipality(ies), citizens and business's if a paradigm shift occurs away from bulldozing a hole and putting MSW in it.

Meaning in the simplest terms what will be the tipping fee costs of any alternative. Not factoring in anything else but that for this discussion.

a.) But logically it would seem that the first question that needs answered in my thought process is there a **compelling desire by the municipality(ies)** to explore the alternatives ?

If the current question of doing something different with 109,000 tons a year of MSW by or before 2016 is what at least we all see *(citizens, elected officials, staff)* is agreed to with the answer of ---- YES.

b.) Then, who will take the leadership role to move this complex shift like this with a clear increase in cost and educate the citizens so they can make a well informed choice ?

It must be factored in that any alternative(s) will cost more than any EPA approved land fill new or old. Any technical solution that I am aware of will be more expensive than landfilling here in the Midwest at this moment in time.

Our costs here even if we think they are high at this moment in time are far lower than many other cities and states for electricity and natural gas here in the United States.

c.) So do we know if available capacity will be an issue when the local landfill closes in 2016?

d.) Do we know if the costs will go up at a normal pace or will they because of supply and demand escalate ?

e.) What are the known options and potential projected costs after 2016 to landfill at other locations outside of Bloomington-Normal ?

f.) Is there date marked on everyone's calender *(citizens, elected officials, staff)* that a choice must be made to what is the next best direction to go for MSW for Bloomington-Normal ?

g.) Is there an organized joint discussion group between the both staffs of Bloomington or Normal with a structure and plans to explore the alternatives ? Assuming to answer this question the question a.) is yes.

h.) Can the cities of Bloomington and Normal jointly commission, build or contract out commissioning and building a MSW plant of their own ?

i.) Do both staffs have their representative governing bodies and thus City Manager release and guidance to pursue a wide range of solutions for 109,000 tons a year of MSW in any alternative way besides landfilling ?

Kindly, keep in mind I am asking the questions not making any suggestions or offering any solutions at this time. This is not to be taken as ANY kind of commentary on you work efforts to date at all. Quite the contrary it is because of your work efforts that I come to be of any help I can on having this discussion to make for all of us well informed choices.

Bruce Meeks

#### Wendy Briggs

From: Sent: To: Subject: David Hales <dhales@cityblm.org> Thursday, October 11, 2012 9:00 AM Mark Peterson; William R Wasson Monthly Meeting

Mark and Bill,

Are the two of you available to meet on Monday morning at 7:00am at IHOP?

One topic I would like to discuss is the Paradigm Waste to Jet Fuel project and its impact on future landfill contracts. I met with Alan and Lester yesterday and can provide you with an update assuming you did not have your own meetings with these two gentlemen.

David

David A. Hales City Manager City of Bloomington 109 E. Olive Street PO Box 3157 Bloomington, Il 61702-3157 P 309-434-2210 F 309-434-2802 <u>dhales@cityblm.org</u>

#### Wendy Briggs

| From:    | Bruce Meeks  |
|----------|--|
| Sent:    | Thursday, February 21, 2013 1:24 PM  |
| To:      | City Council and Mayor; Mayor Chris Koos; Sonja Reece; Cheryl Gaines; Adam Nielsen; Jeff<br>Fritzen; Chuck Scott; Mark Peterson; Pamela Reece; Kevin McCarthy; David Hales; Barb<br>Adkins |
| Subject: | Our Waste Disposal - The Future  |

Dear Elected Officials of both Bloomington and Normal Illinois

This email is about discussing the waste disposal for both cities in the future. Clearly we know that the local landfill will be full by May 2016 unless the waste is taken to for example - Pontiac and Clinton. Which may be already occurring and thus less utilization of the local landfill which might extend it's life. We are all on the same boat here and there is garbage to content with no matter how wonderful we continue to recycle.

My questions are probably already been asked and answered by yourselves and others. So pardon me for not having all the knowledge on this topic. These are my offering of open and transparent questions to add to the discussion.

This email does focus on Waste to Energy which on purpose is not about which design, process or what kind of energy would be produced. (i.e. - syngas, thermal, liquid fuel, steam, bioreactor, algae to oil)

Clearly this particular discussion is focused on the **cash** cost of any alternative to the municipality(ies), citizens and business's if a paradigm shift occurs away from bulldozing a hole and putting MSW in it.

Meaning in the simplest terms what will be the tipping fee costs of any alternative. Not factoring in anything else but that for this discussion.

a.)But what is the solution to this change?

b.) But logically it would seem that the first question that needs answered in my thought process is there a compelling desire by the municipality(ies) to explore the alternatives ?

If the current question of doing something different with 109,000 tons a year of MSW by or before 2016 is what at least we all see *(citizens, elected officials, staff)* is agreed to with the answer of ---- YES.

c.) Then, who will take the leadership role to move this complex shift like this with a clear increase in cost and educate the citizens so they can make a well informed choice ?

It must be factored in that any alternative(s) will cost more than any EPA approved land fill new or old. Any technical solution that I am aware of will be more expensive than landfilling here in the Midwest at this moment in time. Our costs here even if we think they are high at this moment in time are far lower than many other cities and states for electricity and natural gas here in the United States.

d.) So do we know if available capacity will be an issue when the local landfill closes in 2016?

e.) Do we know if the costs will go up at a normal pace or will they because of supply and demand escalate ?

f.) What are the known options and potential projected costs after 2016 to landfill at other locations outside of Bloomington-Normal ?

g.) Is there date marked on everyone's calender (citizens, elected officials, staff) that a choice must be made to what is the next best direction to go for MSW for Bloomington-Normal ?

h.) Is there an organized joint discussion group between the both staffs of Bloomington or Normal with a structure and plans to explore the alternatives ? Assuming to answer this question the question a.) is yes.

i.) Can the cities of Bloomington and Normal jointly commission, build or contract out commissioning and building a MSW plant of their own to produce energy for use by the municipality(les)?

j.) Do both staffs have their representative governing bodies and thus City Manager release and guidance to pursue a wide range of solutions for 109,000 tons a year of MSW in any alternative way besides landfilling ?

Kindly, keep in mind I am asking the questions not making any suggestions or offering any solutions at this time to be helpful in the discussion and moving it forward. The questions should NOT be taken as **ANY** kind of negative commentary to either of the staffs including the city managers. This is for the discussion and interaction between elected officials for an open and transparent discussion so we all can navigate to the right solution.

This is not to be taken as ANY kind of commentary on you work efforts as elected officials to date at all.



#### Wendy Briggs

| From:    | David Hales <dhales@cityblm.org></dhales@cityblm.org> |
|----------|---|
| Sent:    | Wednesday, September 05, 2012 9:13 AM                 |
| То:      | Mark Peterson   |
| Subject: | Paradigm BioAviation - Letter of Interest             |

Mark,

Paradigm has shared with me the two letters of interest you signed on April 30th. They have asked for similar letters from me.

My question is have you briefed all your council members regarding Paradigm's proposed waste to fuel project?

Thanks,

David David A. Hales City Manager City of Bloomington 109 E. Olive Street PO Box 3157 Bloomington, Il 61702-3157 P 309-434-2210 F 309-434-2802 dhales@citybim.org

#### Wendy Briggs

| From:        | Lester Vicary <lesterv@paradigmbioaviation.com></lesterv@paradigmbioaviation.com>   |
|--------------|---|
| Sent:        | Wednesday, November 28, 2012 5:14 PM  |
| To:          | Mark Peterson   |
| Cc:          | Orval J Yarger; Alan Robinson; gailfr@me.com; Mafearfield@aol.com;<br>brumwelljames@yahoo.co.uk   |
| Subject:     | Paradigm BioAviation Presentation of 12-17-12 Meeting   |
| Attachments: | LWV Paradigm BLN city council presentation - articles.pdf; LWV Paradigm BNL<br>city council presentation.doc; Lwv Paradigm BNL-Power Point Presentation-28Nov12.pdf;<br>LWV Paradigm Biomass Magazine Editor Ltr on MSW - Oct. 2012.pdf |

Mark:

It is my understanding that you have placed us on the December 17 agenda for the city council. Thank you for your efforts in allowing us to make a presentation to the city council members.

Attached are the following documents which we would like distributed to the council members. For purposes of the slide presentation, I understand from Orval that you need a thumb drive with the Power Point presentation. I will have to get you that in the next few days.

- 1. Power Point presentation
- 2. Brief summary of our project
- 3. Articles on making biofuels from municipal solid waste
- 4. Letter from editor of Biomass Magazine -- October 2012 issue

Our presentation will last approximately 20-30 minutes, including time for questions, if that fits within your meeting agenda.

Sincerely,

## Lester Wm. Vicary, Jr.

Lester Wm. Vicary, Jr. Director of Business Services Paradigm BioAviation, LLC LesterV@paradigmbioaviation.com/ http://www.paradigmbioaviation.com/

309-275-6310



# **Paradigm**BioAviation

The **Paradigm Energies Group** has invested 3 years researching the feasibility of producing alternative aviation fuels and green electrical power using locally available feedstock, specifically Municipal Solid Waste. Paradigm is now positioned to be a leader in the production and delivery of competitively priced alternative aviation and renewable diesel fuels to commercial, corporate and military aviation users. The first such facility, an Integrated Bio-Refinery, will be constructed in Bloomington-Normal, Illinois, with production targeted for late 2015.

A key driver for Paradigm has been to mitigate the risk associated with this emerging industry. Thus Paradigm has structured the Bloomington-Normal project in two consecutive phases. Phase One includes a Materials Recovery Facility which will process recyclables, contain a gasification plant to produce Syngas for use in a Power Island, which will produce green electrical power. Phase Two will be the construction of a full scale Gas to Liquids plant, producing alternative jet and diesel fuels.

The conversion of Municipal Solid Waste, through gasification, for the production of green electrical power is a low risk and proven technology, and the gasifier selected by Paradigm is utilized in over 1,000 plants around the world. While the process for converting gases to liquid fuels was first commercialized in 1936, the process has been mainly utilized in large scale refineries. Production utilizing a scaled down Gas to Liquids plant is in the advanced research and development stage, with several pilot plants in operation in the USA and other parts of the world. Paradigm will construct a small, 15 tons per day Gas to Liquids plant concurrently with the first phase, to facilitate onsite testing and refinement of Gas to Liquids technologies. In Phase Two, a full scale Gas to Liquids plant will be built, with the pilot plant then being utilized for development work on alternative feed stocks and technologies, thereby extending the range of technologies that Paradigm will possess in pursuit of future business strategies.

Upon completion of both phases, the project will generate three distinct revenue streams -1) sale of recyclables; 2) sale of alternative fuels; and 3) sale of green electric power. By-products of water, recovered heat, and BioChar will also be produced. BioChar may be sold as a fertilizer, a soil amendment or a Solid Recovered Fuel, which is used as a green power source by power plants and cement kilns.

The Paradigm Energies Group has a long-standing aviation pedigree of commercial airport ownership & operation. Its management team also brings a wide range of demonstrated experience, achievement and capability in the fields of chemical production plants, fuels research and development, waste management, and property development. Its senior executives have extensive global business experience. Paradigm has also aligned itself with key local businessmen who possess extensive expertise in areas needed to move the project forward at the local level. It has a working relationship with Illinois State University, who has been selected to conduct economic impact and feasibility studies, perform analysis of the Municipal Solid Waste and other feed stocks, and to conduct testing and research in the Gas to Liquids portion of the project. Paradigm has entered into a teaming agreement with Hensel Phelps, a construction company with annual sales of over \$3 Billion, for the design, development and construction of the facility, and with Southern Research Institute – North Carolina, to provide Municipal Solid Waste to Syngas gasification equipment for

electric power production and to provide its proprietary Gas to Liquids system, currently being tested in Durham, NC, for the conversion of Municipal Solid Waste to liquid fuels.

The Bloomington–Normal facility is the first of six identified sites where Paradigm plans to construct future plants. All of the sites have been selected based on the criteria of 1) their close proximity to regional airports which have a significant need for alternative aviation fuels; 2) the existence of a sufficient long term feed stock supply, primarily Municipal Solid Waste; and 3) the existence of solid business relationships previously established by the Paradigm management team. These locations are in the USA, Caribbean, Europe and Central America.

All domestic and commercial unsorted Municipal Solid Waste is delivered to the plant tipping floor for pre-screening. A sophisticated "Dirty" Materials Recycling Facility is then used to remove all recyclables such as glass, ferrous metals, plastics, plastic bottles, tin, aluminium, copper, and aggregates. This process combines the use of automated, manual and semi-mechanical methods to leave a residue of organic matter for consumption in the gasifier. Construction waste is hand sorted into organics and aggregate. Tires are shredded for gasification, with the steel banding removed for recycling. Yard waste, trees and brush can by processed "as-is" for fuel. It is projected that only 7% of incoming materials will not be processed or sold; requiring transport to a landfill. The organic material is processed into a Solid Recovered Fuel of 25MM by shredding/grinding/drying and then fed into a gasifier that recombines the carbon molecules into a Syngas fuel and BioChar solids. In Phase One the Syngas is mixed with methane to power multi-gas turbines connected to electrical generators for the generation of electrical power. In Phase Two the Syngas is passed directly into the Gas to Liquids plant for production of alternative liquid fuels.

The existing process technologies for a Materials Recycling Facility, gasification to Syngas and power island, are well proven and in widespread commercial operation today. However the optimum operating parameters of a small scale Gas to Liquids production plant (verses Gas to Liquids in large refineries) are still in the demonstrator stage. There is a Municipal solid Waste to alternative fuels batch pilot plant online in Chicago. Numerous demonstrator size plants are in the construction stage throughout the USA. British Airways is currently constructing a large, commercial scale Gas to Liquids plant outside of London for the production of power and 16 million gallons per year of alternative jet fuel. Paradigm believes, as does its technology partners, that technology and costs for a full scale, commercially viable Gas to Liquids system will exist by 2015.

Southern Research Institute, our technology-teaming partner, has proven experience with commercially proven gasifiers and is operating two gasifier pilot operations at their facility in Durham, NC. They also have proven experience in directly integrating the organics derived from MSW with their gasifier and Syngas clean-up system, using multifunctional Gas to Liquid catalysts. When properly integrated, these systems reduce capital expenditures and enable the design of commercially scalable integrated plants.

Commercial aviation is challenged by the rising and uncertain cost of jet fuel, which comprises about 40% of commercial carrier operating costs. Airlines are further challenged by their significant

contribution to green house gases through carbon emissions. The EU Emissions Trading Scheme, effective January 2012, imposed a carbon emission tax on all aircraft which fly in European air space. Using alternative jet fuel will mitigate this tax. Alternative aviation fuels are now seen as a critical component to reversing the emissions impact on the environment and potentially stabilizing fuel prices.

Since 2010, over 30 airlines have test flown or implemented commercial use of alternative jet fuel. Both the US Air Force and Navy have flown aircraft supersonically on alternative jet fuel and the Navy has run multiple surface ships on alternative fuels. The Air Force and the Navy have each committed to operating universally on a new single "battlefield" fuel comprising a 50/50 blend of alternative/fossil fuel by 2016 and 2020 respectively. Industry experts estimate there is need for at least 500 new Integrated Bio-Refinery in the USA and some 2,300 are projected to be needed in Europe.

Paradigm has assembled a core team of experienced executives from the aviation, chemical, petroleum and property/land development industries that have worked together for several years. Collectively they have experience in owning, developing, constructing and managing major capital assets in the US, UK and the rest of Europe, Middle East, South Africa and Australia, including owning and/or operating airports and fixed base operations at airports, and operating chemical plants. The team has significant involvement in new technology development and integration, from research through to commercialization.

Alan Robinson - President & CEO

James Brumwell LLB - Director & General Counsel

Michael Fearfield - Director

**Orval Yarger - Director** 

Gail Farrin Robinson - Projects Director

**Lester Vicary - Director of Business Services** 

Dr. Steven Johnson - Head of Process Research & Technology Integration

Paradigm is currently working closely with the following professional advisors:

Illinois State University (ISU) will be commissioned to perform the following tasks:

- Analysis of local supply chain MSW, agricultural waste, food waste, tires, etc.
- Sustainability analysis and Economic Impact Study
- Review of end-to-end supply chain and resultant carbon footprint
- Quality control, testing, issues related to blending of fuels, certification, etc.

**Southern Research Institute** – operates a 3 and 10 ton per day pilot plant in Durham, North Carolina. Will provide the gasifier and GTL equipment. Southern has over 25,000 hours of experience in operating thermochemical conversion systems, for governmental and commercial clients. It will provide the core integrated conversion technology.

Andrews Engineering, Springfield, Illinois – Provide the schedule, costs and "fatal flaw" analysis for the entire zoning and permitting process. Served as engineer of record for all landfills located in the Bloomington/Normal and several others throughout Illinois. They have significant successful experience in the community, are specialists in obtaining permitting and zoning for landfills and Municipal Solid Waste transfer stations.

**Hensel-Phelps Construction Company** – provides EPC services for the federal government as well as a multitude of national and international clients. Annual sales in excess of \$3 Billion. Committed to becoming a major contractor in the area of renewable energy plants.

**Stern Brothers & Co.** – Will structure the tax-free bond offering. Has extensive experience in USDA bond issues for the bio-fuel and renewable energy field.

**Clifton Larson Allen, CPA** –  $8^{th}$  largest accounting firm for privately held businesses. Will provide tax advice, conduct mass energy studies, review of financial models, and perform cost segregation analysis for construction of the Integrated Bio-Refinery. Coordinate international tax issues and corporate structure with UK tax advisors.

#### **UK Professional Advisors**

Shipleys, LLP, London - Auditors

IFS - International Fiscal Services Ltd. - International Tax Advisors

Charles Russell - London - Legal Advisors

Berwin Leighton Paisner -- Legal Advisors

Crose Window

#### technology review Published by MIT





The New York Eimes

Wednesday, May 27, 2009

#### **Converting Garbage into Fuel**

Waste Management, a large waste company, gives technology for gasifying trash a boost. By Kevin Bullis

Waste gasification, a process for converting garbage into fuel and electricity without incinerating it, may be a step closer to large-scale commercialization. Last week, Houston's Waste Management, a major garbage-collection and -disposal company, announced a joint venture with InEnTec's startup based in Richland, WA, to commercialize InEnTec's plasma-gasification technology.

Waste Management will fund the new venture, which will be called S4 Energy Solutions, as well as provide infrastructure and expertise from its waste-collecting and -processing businesses to make the technology economical. The company, which will operate and market plasmagasification technologies will be announcing specific projects to build facilities later this year. The involvement of Waste Management could signal that the technology, which has been more expensive than other waste-disposal options, is finally reaching a stage at which it can be practical. "Up until late last year, it was under the radar," says James Childress, the executive director of the Gasification. Technologies Council, "Now the big players are finally getting involved in this."

InEnTec's technology, originally developed at MIT and the Pacific Northwest National Laboratory, in Richland, VVA, uses a multiple high temperature processes uncluding subjecting garbage to plasma arcs--to break down organic materials into syngas, a mixture of hydrogen and carbon monoxide. Syngas can either be directly burned in gas turbines to produce electricity, or it can be converted into other fuels, including gasoline and ethanol. Metals and other inorganic materials in garbage can be isolated and recycled. The combination of high temperatures and an oxygen-pcor environment that prevents the garbage from catching fire eliminates the production of dioxins and furans, two toxic chemicals produced during incineration.

That core technology has been proved, says Joseph Vaillancourt managing director at Waste Management and the senior vice president of the new joint venture. What's kept it from being commercialized, he says, is the need to develop the processes for economically collecting and feeding waste into the system, and on the "back end" pairing the syngas produced with gas turbines for generating electricity or other chemical processes for converting it into fuels. Vaillancourt says that Waste Management has already developed infrastructure for collecting and processing waste and for using heat from incinerators for generating electricity, and it will employ its "knowledge and wherawithal" to develop an "integrated system" using InEnTec's technology

S4 Energy Solutions plans to market the first gasilication units in specialized markets such as those concerned with the disposal of automobile shredder residue or medical waste. for which landfills often aren't an option, hence companies are willing to pay more to dispose of waste Eventually, they could be used more generally for municipal solid waste, especially in rural towns and small cities that do not produce enough waste for cheaper incinerator technologies to be practical. The technology has the benefit of allowing customers to generate some of their own electricity, which could make it more affordable.

There may still be hurdles to commercial success. Childress notes that waste gasification may still face problems with local regulations. And companies using similar technologies have failed in the past. Nevertheless, some waste-gasification companies are reporting initial success. For

http://www.technologyreview.com/printer\_friendly\_article.aspx?id=22703

1/20/2012

example. Enerkem, based in Edmonton, Alberta, has opened a commercial facility to convert used utility poles into methanol and ethanol. It has signed an agreement with the city of Edmonton to process 100,000 tons of municipal solid waste a year for 25 years, although that's still a relatively small amount compared with other options for disposing of waste

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Crose Window

### technology review

Published by MIT

, replay

#### Plug and play with IBM's Netezza Get the facts

Friday, December 21, 2007

#### Fuel from Waste

A portable system converts blowaste into jet fuel and diesel for the military By Prachi Patel

Last year, the U.S. military used more than five billion gailons of petroleum-based fuels Transporting the fuel to battle zones and remote military bases is costly and time consuming and the fuel is a prime target of terrorists. So the U.S. Department of Defense is looking for cheaper, more secure and easier options

Two companies, Diversified Energy and Velocys, are working together on a portable system that converts coal, natural gas, and biomass into diesel and jet fuel. The military could use the system to convert waste created at military bases- food scraps, paper, wood--into a fuel for military jets and vehicles

The system has two main parts, a gasifier and a fuel reactor. Diversified Energy, an energy company based in Gilbert, AZ, will make the gasifier that converts any carbon-containing material into a mix of carbon monoxide and hydrogen, known as synthesis gas, or syngas. The fuel synthesizer made by Velocys, based in Plain City, OH, will convert the syngas into a hydrocarbon siquid fuel

Converting waste into fuel at defense bases is the answer to two problems that the military faces, says End Saltler, project engineer at the army's Tank-Automative Research. Development and Engineering Ceriter, which is funding the new project. The transportation of fuel to bases accounts for 70 percent of military trucks and convoys that are on the road in Iraq and Afghanistan. At the same time, the military has to truck out waste from bases to dispose of it.

Portability is the key aspect of the waste-to-fuel system. Enk Kathol power and energy technology team leader at the army's research and engineering center, says that the system will have to be scalable to different sizes, making daily anywhere from about 2,100 to 21,000 gallons of fuel, while weighing between 150 and 1.500 tons, respectively. The system should also be able to make fuel from various feedstocks, including coal and natural gas.

Jeff Hassannia, vice president of business development at Diversified Energy, says that the new gasifier and reactor technologies should meet these requirements. The military should be able to move the system on a semitruck or an aircraft carner, he says

in conventional gasifiers, holl steam or air is mixed directly with the biomass. But in Diversified Energy's gasilier, coal or biomass is introduced into a bath of molten iron and tin at a temperature of 1 300 °C to which steam has been added. Any carbon source immediately gasifies and produces carbon monoxide and hydrogen, says Hassannia. Using mollen metal keeps the gasifier compact and produces syngas with significantly fewer impurities, which eliminates the cost of deaning it

Velocys's reactor, which converts the syngas into liquid fuel, is also compact and efficient. It is made of tiny cossciousing channels, each between 0.01 and 0.2 incres wide. The syngas flows through some of these channels, where it comes in contact with a cobait-based catalyst and gets converted into long chains of hydrocarbons. Other channels in the reactor carry a coulanttypically water -to absorb the heat from the catalytic reaction

http://www.technologyreview.com/printer\_friendly\_article.aspx?id=19974

12/16/2011

Page 1 of 2

## British Airways partner with Solena to convert trash into jet fuel

By Andrew Nusca | February 16, 2010, 7:58 AM PST

British Airways and Washington, D.C.-based bioenergy firm the Solena Group announced on Monday a partnership to establish Europe's first sustainable jet-fuel plant and convert trash into jet fuel.

The new fuel will be derived from waste biomass and manufactured in a new facility that can convert several types of waste materials destined for landfill into aviation fuel.



The airline said it plans to use the low-carbon fuel to power part of its fleet beginning in 2014.

The self-contained plant will likely be built in cast London. It's expected to convert 551,000 tons of waste into 16 million gallons of green jet fuel each year.

Quick hits about the savings:

- The plant offers lifecycle greenhouse gas savings of up to 95 percent compared to fossil-fuel derived jet kerosene.
- · The project will reduce the volume of waste sent to landfill.
- The plant itself will be CO2 neutral, and will emit oxygen, plus small quantities of nitrogen, argon, steam and earbon dioxide.
- The only solid waste product is an inert vitrified slag material, which can be used as an alternative to aggregates used in construction.
- Tail gas can be used to produce 20MW of excess electricity for export to the national grid or converted into steam to be used in a district heating system.

The green fuel will be produced by feeding waste into a patented high temperature gasifier that produces BioSynGas, or biomass-derived synthetic gas. Using a process known as Fischer Tropsch, the gas is converted into biofuels to produce biojet fuel and bionaphtha.

Bionaphtha is used as a blending component in gasoline, as well as a feedstock for the petrochemicals industry.

The resulting fuel would make all of British Airways' flights at nearby London City Airport varbon-neutral, and is the equivalent of taking 48,000 cars off the road per year, BA says.

http://www.smartplanet.com/blog/smart-takes/british-airways-partner-with-solena-to-con... 12/16/2011



TIM PORTZ > CE PRESIDENT OF CONTENT & EXECUTIVE EDITOR tportz@bbuildemational.com

#### On Not Wasting the Energy Potential in Waste

Biomass to energy projects often fail to attract investors and debt partners because of their inability to demonstrate a reliable and consistent feedstock plan along with some assurance of long-term price stability. Coupled with the fact that large volumes of biomass feedstocks often found well away from major population centers, it becomes readily apparent why biomass-to-energy projects often struggle to move beyond the conceptual stage.

Viewed in that context, municipal solid waste is a veritable dynamo as a feedstock. The U.S. EPA esumates that on average, every American generates nearly 4.5 pounds of waste each day. When it comes to waste, feedstock availability and population—and energy demand, by extension—are highly correlated. Waste also has a well established, robust and efficient collection system that is paid for by collection tipping fees.

Why then, does the U.S. lag so far behind other parts of the world in waste to energy? The International Solid Waste Association reports that Europe boasts nearly rive times more waste to energy (W(1)) facilities than the U.S. Perhaps the abundance of available land to dispose of waste plays a role. Waste professionals orien talk of a mythical place known as "away," a location that the public believes is the final destination for its refuse. When attempts are made to retrieve this valuable feedstock from "away," and produce energy from it, however, public outcry often begins. Opponents of WtE facilties quickly hang the "garbage burner" label on a project and developers find themselves forced into a public education role to keep their project moving forward.

This month's issue of *Biomas Magazine* is nothing if not a firm reminder that the WiH industry in this country continues to innovate and evolve in spite of the rampant misinformation that persists about its technologies and environmental footprint. Anna Simer's feature "Maximizing Metal Recovery" highlights the value delivered to WiH tacintes and the general public through the continued advinces made in tronts and back-end metal recovery at these facilities. Luke Geiver's feature on downdratt pastification is not only a compelling technology feature, but also reinforces how WiH projects so other, solve multiple problems simultaneously.

Waste does not go "away" nor should it. In all forms it carries energy, and because of its long list catadvantages as a feedstock, developers will commute to etc. it for conversion into power, thermal energy and, increasingly, liquid fuels. While the general public can wring their hands, our industry knows that a retrasal to capture energy from this ubiquitous feedstock would be an incredible waste





**Paradigm**BioAviation

## Transforming Municipal Solid Waste

#### Into Renewable Bio-Jet Fuel

Bloomington - Normal, Illinois

Alan Robinson, President & CEO - Alan R@paradigmbioaviation.com



## **Mission Statement**

Production of Renewable fuels and Power for commercial, corporate and military markets through deployment of Bio-Synthetic fuel production technologies into regional Integrated Biofuel Refineries (IBR's) using locally available feedstock

Paradigm is committed to the Sustainability of Aviation and reduction of Green House Gases though production, commercialization and use of Alternative Fuels in Regional Airports to:

reduce aviation carbon emissions to ICAO objectives
 empower communities with green options for energy & jobs
 facilitate Zero Landfill growth & single stream recycling
 significantly reduce dependence upon imported fossil fuels.
 buffer military against Peak Oil with local fuel production



ParadigmBioAviation

## What is Paradigm - Our Roots

We are historically an Aviation, Telecommunications, Chemicals, Pharmaceutical, Property and Infrastructure Group – USA, UK and Europe.

-Aviation - Owned, operated, & designed regional commercial airports and FBO's in UK, Europe and South Atlantic plus part 91 & 135 operations -30 yrs experience

-Telecommunications - Owned & operated Telephony, Cable TV, Submarine cable and Wireless - founded Telewest (UK) which IPO'd for  $\pm 1.4bn - 24$  yrs experience

>Chemical & Pharmaceutical - Managed plants in USA and Europe -25yrs

-Infrastructure construction- Middle East & Europe - regional power generation, roads, Airports, telecoms systems -land, submarine, wireless, and IDC's



**Paradigm**BioAviation

#### **Paradigm's Answer to Aviation Emissions Challenges**



## Why now – Global and Economic Drivers

- Peak Oil- It's going to happen, its only a matter of time early adoption is a must.
- Commercialization of IBR technology has been a long process
- Regional fuels production is a new paradigm (& window of opportunity)
  - Obtaining sustainable local feedstock is crucial.
- Zero new landfills is being socially responsible
- Support & Consensus with State & Local government as is essential.
- Additional airport & upgrade infrastructure will be required to meet future Carbon Neutral aviation needs.





## RFS2 Calls for 36bn gpy by 2022



The Renewables Fuel Standard 2 (RFS2), Calls for 36bn gallons per year to be in production by 2022



#### **MSW Becomes an Alternative Fuel**



#### Paradigm's answer to aviation emissions challenges





## **Alternative Fuels Production & Delivery**

#### PARTNERSHIPS FOR BNL PLANT CONSTRUCTION



#### FULL COMMERCIAL PLANT- 330 tpd





## Alternative "Drop-In" Bio-Jet Fuel

- Very Positive Progress
- New ASTM D7566 Jet fuel standard approved –Sept 2009
- Multiple Commercial Airlines trial flights on Bio-Jet in 2010
- Military fly supersonic on Bio-Jet in 2011
- DOD place standing order for 315M gals Bio-Jet by 2014
- USDA guarantees 80% loans for 6x new production plants
- USDA, DOE, & Navy to invest \$510M in PPP's over next 3 yrs
- AirAlaska-weekly commercial flights
   -2011

"Drop-In" Alternative Fuel >

- More to go at Airports
- Separated Airport storage & delivery systems require new investment
- Lifecycle Carbon Accounting, Land Use Change and EUETS means more accounting/administration
- Increased quality control, remote monitoring & certification begs new automated processes
- Potential for increasing staffing required at Airport/FBO
- Positive Opportunity for increased revenues
- Paradigm FBOCA, AAFSMAD & PBAUG programs to address issues

Not Yet "Drop-In" at Airport

In Commercial Confidence

13

## **Economics of Alternative SPK-Jet at BNL**

- MSW is long-term sustainable feedstock
- Conversion to Alternative fuels is cost competitive to conventional fossil fuels
- Processing provides superior local recycling of metals, glass and plastics –reduces city operating costs
- Local production and local consumption reduces transportation costs and increases profitability
- Creation of 760+ direct, indirect & induced green jobs
- Circa 70% of \$120 million of construction materials and labor costs will stay in Illinois.
- Alternative SPK-Jet produced at BNL plant will reduce carbon emission by 150,000 tons



## **Opportunities of Paradigm at BNL**

- Installation of lower cost single stream MRF for Residential MSW, C&D and commercial waste
- > Potential for Mining of existing landfills with creation of new AirSpace
- MSW to liquid fuels and power plant with processing capacity of 185,000 tons/yr.
- Production of c.10M g/yr of Alternative fuels principally SPK-Jet Fuel plus power on 60 acre site adjacent to McLean County Landfill
- Existing long-term Off-take agreement for supply of SPK-JetFuel to BMI airport
- Eliminate need for new landfill in 2014 at BNL
- Use of existing Methane supply for enhanced production
- Greatly reduce need for daily trucking of Jet fuel from Whiting, IL/Indianapolis, IN.
- Sustainable economic benefits for local community and the regional aviation industry with opportunities for spin-off industries.



## **Benefits to Bloomington-Normal**

- TOWARDS "ZERO LANDFILL" no need for new landfill post 2014
- SINGLE STREAM Waste Collection Sophisticated MRF will increase recycling and decrease collection costs to cities
- POWER GENERATION opens possibility for GREEN MICRO-GRID for ISU and Electric Cars, for example
- ALTERNATIVE FUELS Production Local availability of Alternative-Jet, Diesel & Gasoline reduces dependency on imported fuels, attractive to Airlines, cleaner environment
- SPIN-OFF INDUSTRIES plastics building materials from recycled waste
- EMPLOYMENT Generates in excess of 1,600 Green Jobs
- INWARD INVESTMENT c. \$120 million, 70% spent in Illinois
- MULTIFACITED R&D Platform Long-term benefits for ISU and U of I and association with MIT/FAA/NASA
- POSITIVE ECONOMIC IMPACT to regional economy of c. \$200 million



#### Wendy Briggs

| From:    | Marty Vanags <mvanags@bnbiz.org></mvanags@bnbiz.org>         |
|----------|--|
| Sent:    | Monday, February 04, 2013 11:04 AM                           |
| То:      | Mark Peterson; David Hales; Mayor Chris Koos; Steve Stockton |
| Cc:      | Ken Springer; Mike O'Grady                                   |
| Subject: | Paradigm   |
|          |  |

This is a follow-up to the due diligence we have been conducting regarding waste to Biofuels. Below you will find an email that was sent to Mike O'Grady regarding waste to fuel projects. The research was done by Dr. Bierma (retired) from ISU. We talked to Dr. Bierma because he has some knowledge and interest in the subject. The websites are interesting.

Marty Vanags

-----Original Message----From: Tom Bierma [mailto:tbierma@ilstu.edu] Sent: Monday, February 04, 2013 7:51 AM To: Mike O'Grady; 'Michael Brown' Cc: <u>laloftu@ilstu.edu</u> Subject: Paradigm - lessons from Edmonton

Mike and Michael,

Edmonton, Alberta might have some useful lessons for B/N as we consider Paradigm's waste-to-biofuels (WTB) project.

Edmonton currently diverts 60% of its waste - 20% to recycling and 40% to compost. TheY have a single-stream recycling program with a local MRF, and appear to operate a dirty MRF where they separate compostables and additional recyclables.

They are about to start diverting another 30% to a WTB facility similar to Paradigms, but producing ethanol instead of jet fuel. See the following link:

#### http://webapps.icma.org/conference\_Handouts/handouts2012/2012%20ICMA%20Annual%20Conference\_Edmonton% 20Enerkem%20joint%20presentation.pdf

The WTB facility appears to be based only on non-recyclable, non-compostable wastes and the city believes the MRF and compost operation are not threatened by WTB. It is interesting to note that the 10 MGY WTB facility costs about \$105 million. The facility will also use creosote-treated wood as a feedstock. It would be interesting to see Edmonton's environmental evaluation of the plant.

The good news IS that WTB is not necessarily incompatible with a thriving recycle and compost program. However, Edmonton has a population of about 1 million. Could B/N provide enough non-recyclable, non-compostable waste?

Another interesting document is the SEC disclosure form filed by Enerkem, the company building the WTB facility in Edmonton (<u>http://www.nasdaq.com/markets/ipos/filing.ashx?filingid=7999985</u>). The risk section is sobering, even though this company has years of experience operating a demonstration facility. I would think the risks for Paradigm would at least as great.

A final note is the list of cellulosic biofuel facilities that are approaching commercial operation (<u>http://ethanolrfa.3cdn.net/d9d44cd750f32071c6\_h2m6vaik3.pdf</u>). Note that many of them will use MSW as their

feedstock. Some produce fuel through fermentation, but many use gasification followed by chemical synthesis. It is clearly a technology that has arrived - for better or worse.

Field trip to Edmonton! (once it warms up)

Tom

Thomas J. Bierma, MBA, Ph.D. Research Professor of Environmental Health Illinois State University 309/438-7121 tbierma@ilstu.edu

Marty Vanags, CEO Economic Development Council of the Bloomington-Normal 200 W. College Ave. Suite 402 Normal, IL 61761 P: 309-452-8437

Email: <u>mvanags@bnbiz.org</u> Twitter: @bnedguy

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Email: <u>mvanags@bnbiz.org</u> Twitter: @bnedguy

#### Wendy Briggs

| From:        | Mark Peterson   |
|--------------|---|
| Sent:        | Friday, December 14, 2012 4:03 PM   |
| То:          | Justin Kagy   |
| Cc:          | Mindy Dance   |
| Subject:     | Presentation Change for Monday evening  |
| Attachments: | Normal Pres-PBA HP SRIV5Final-17 Dec12.pptx; 121012 Dave Loomis PPT.ppt; Hensel |
|              | Phelps power point - 6 slides.ppt; SRI WTE System Summary v2 12-7-2012-1.pptx   |

Justin, The group from BioAviation have asked that the following presentations be loaded on the Council laptop for the meeting on Monday evening. You can remove the previous presentation as it has been modified. I attached the four presentation in the order that they should be loaded. Thanks! mp

Mark R. Peterson City Manager Town of Normal Normal, IL 61761 (309) 454-9777 <u>mpeterson@normal.org</u>

"Committed to Service Excellence"

Please consider the environment before printing this e-mail



**Paradigm**BioAviation

## Transforming Municipal Solid Waste

## into Alternative -Jet Fuel & Power

Normal, Illinois Monday December 17, 2012





# **Presentation Team**

## Paradigm BioAviation LLC

Alan Robinson - President & CEO

Doug Nord - Chairman Paradigm Advisory Board

## Southern Research Institute

Dr. Steven Johnson – Paradigm Head of Process Research & Technology Integration, presenting for SRI

## Hensel Phelps Construction Co

Lester Wm Vicary - Paradigm Director of Business Services, presenting for HPC.

## ISU

17 December 2012 ParadigmBackwatter

Prof. David Loomis – Director, Center for Renewable Energy, Executive Director, Institute for Regulatory Policy Studies

# **Our Mission Statement**

The Production of Alternative Fuels and Power for commercial, corporate and military markets through deployment of Bio-Synthetic fuel production technologies into regional Integrated Biofuel Refineries (IBR's) using locally available feedstock, to:

- > Converting organic waste (Agro & MSW) to Liquid Fuels and Power
- Empower communities with green options for Energy & Jobs
- Facilitate Zero Landfill growth & single stream recycling
- > Significantly reduce dependence upon imported fossil fuels.
- > Buffer military against Peak Oil with local fuel production
- Reduce aviation carbon emissions to ICAO objectives





ParadigmBioAviation
17 December 2012

# Paradigm's – Our Roots

We are historically an Aviation, Telecommunications, Chemicals, Pharmaceutical, Property and infrastructure Group – USA, UK and Europe.

-Aviation - Owned, operated, & designed regional commercial airports and FBO's in UK, Europe and South Atlantic plus part 91 & 135 operations -30 yrs experience

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Infrastructure construction- Middle East & Europe - regional power generation, roads, Airports, telecoms systems -land, submarine, wireless, and IDC's

ParadigmBioAviation

# Our IBR Project Teaming Partners

## **Hensel Phelps Construction Co**

Our EPC and General contractor

## **Southern Research Institute**

Our Gasification and GTL technology development supplier

## **Illinois State University ISU**

Our Economics and Feedstock Research provider





ParadigmBioAviation
17 December 2012

## Paradigm's MSW to Alternative JetFuel Timeline

For MSW to Alternative Aviation Fuels & Power IBR plant in Bloomington, IL

## **Preparation and Development Phase**

- 2006 Investigate Carbon CO<sup>2</sup> reduction in Coventry Airport, operations, UK
- 2009 ACI Europe launches Airport Carbon Accreditation ACA program at AGM.
- 2009 EU commission announces EUETS tax on aircraft emissions will take effect in January 2012.
- 2010 Paradigm moots vertical integration for Airport & Aircraft Carbon Emission reductions with production and use of Alternative Fuels instead of CER credits for planting "Trees in Brazil"
- 2010- 2011- Extensive research into feedstock, Algae, Jatropha, Camalina, Switchgrasses, Wood Pellets, and Organic Wastes – Crop and MSW
- 2011-2012 Working from AIRCRAFT BACKWARDS Research supply chain risks, feedstock types & availability, production methods, site locations, airport storage, blending and inter-plane infrastructure



## Paradigm's MSW to Alternative JetFuel Timeline

For MSW to Alternative Aviation Fuels & Power IBR plant in Bloomington, IL

#### Permitting, Construction and Operational Phases

- 2012 Secured land, feedstock availability, off-take agreements, technology options, modeling, risk mitigation and routes to market.
- 2013 site permitting, interconnection studies, EPC work, bond funding, etc.
- 2014- 2015 Construction & commissioning for MRF, Gasification, Power & GTL Pilot
- 2016 BNL Landfill closes Start Full commercial operation of MRF, Power & RDF plus GTL pilot
- 2017 Commercial Alternative fuels plant constructed based on cost scalability of GTL
- 2018 Full production of alternative aviation fuels JetA, 100LL, Diesel & Gasoline
- 2017 Replication of Paradigm MRF/IBR facilities in in USA, UK and EU, regional and island communities with airports



17 December 2012

ParadigmBioAviation

## Paradigm's Answer to Aviation Emissions Challenges



## Why now - Global and Economic Drivers

- Peak Oil- It's going to happen, its only a matter of time early adoption is a must.
- > Commercialization of IBR technology has been a long process
- Regional fuels production is a new paradigm (& window of opportunity)
  - Obtaining sustainable local feedstock is crucial.
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- Support & Consensus with State & Local government as is essential.
- Additional airport & upgrade infrastructure will be required to meet future Carbon Neutral aviation needs.



## RFS2 (EPA) Calls for 36bn gpy by 2022



<sup>:</sup> H.R. 6 - Energy Independence and Security Act of 2007



**MSW Becomes an Alternative Fuel** 







Aanchester Metropolitan Un

Plasma2Energy [J] Bnergy, UTI/(CR) Caterpillar, MDT

Hensel Phelos

S.Atkins, Arcadis Jacobs

TEC de Montegrey

University of Illinois MIT - Project 28 vewcastie University

17 December 2012

PARADIGN'S SELECTED PROCESS



## FULL COMMERCIAL PLANT- 330 tpd



Concept Drawing of 11.7 MWe MSW to Power Plant



. P**aradigm**®icAviati≎n Concept Drawing of 11.7 Mwe with 6 gasifiers & generators



Paradigm®ioAvotran

# Actual 11.7 Mwe MSW to Power Plant at Nottingham UK



ParadigmBioAviation

Gasifier section of Plant at Nottingham UK



## Economics of Alternative Jet Fuel & Power

- > MSW is long-term <u>sustainable feedstock</u>
- Conversion to Alternative fuels is <u>cost competitive</u> to conventional fossil fuels
- Processing provides superior local recycling of <u>non-</u> <u>sorted waste stream</u>, removing metals, glass and plastics -reduces city operating costs
- Local energy production and local consumption reduces transportation costs, CO<sup>2</sup> emissions and increases local profitability
- Creation of 760+ direct, indirect & induced green jobs
- Circa 70% of \$120 million of construction materials and labor costs will stay in Illinois.
- Alternative Jet Fuel produced at BNL plant will reduce carbon emission by 150,000 tons



**Paradigm**BioAviation

# Benefits to Normal & Bloomington

- TOWARDS "ZERO LANDFILL" no need for new landfill post 2016
- INCREASED EFFICIENCY of recycling Sophisticated MRF will increase recycling and the removal of materials from the present waste stream
- POWER GENERATION opens possibility for GREEN MICRO-GRID for ISU and Electric Cars, for example
- ALTERNATIVE FUELS Production Local availability of Alternative-Jet, Diesel & Gasoline reduces dependency on imported fuels, attractive to Airlines, cleaner environment
- SPIN-OFF INDUSTRIES building and energy materials from bio-char and recycled waste
- **EMPLOYMENT** Generates in excess of 700 Green Jobs

2.38

- INWARD INVESTMENT c. \$120 million, 70% spent in Illinois
- MULTIFACITED R&D Platform Long-term benefits for ISU and U of I and association with MIT/FAA/NASA
- POSITIVE ECONOMIC IMPACT to regional economy of c. \$200 million



17 December 2012

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# Key Issues for 2013



# **OPPORTUNITY FOR A GREENER FUTURE**

In 2013 Normal has the opportunity to embrace Energy Production & Materials recovery from its MSW and significantly reduce its CO<sup>2</sup> emissions

## OR

Continue to truck its MSW to distant landfills thereby increasing its Carbon Emissions and Carbon Footprint.

