

## **Presentation for Joint Bloomington-Normal Review Session**

### **Content**

- 1. History of the Paradigm Energies Group**
- 2. Alan Stuart Macdonald Robinson - Biography**
- 3. Paradigm Management Team and Advisors**
- 4. Summary of the Paradigm Integrated Bio-Refinery ("IBR") Processes**
- 5. Summary of Financial Details of the BNI Project**
- 6. Letters of Support**
- 7. Appendix A**
  - a) Description of the Paradigm IBR processes and facility**
  - b) Paradigm's answer to Aviation Emission challenges in diagrammatic form**
  - c) Comparative Analysis of Financial Benefits to BNI of Paradigm IBR Facility**
  - d) Reprint of an article about Alan Robinson, as a client from the London Chartered Accountancy firm Shipleys LLP.**



## **1. History of the Paradigm Energies Group**

Paradigm Energies Limited is a UK holding company with a wholly owned USA operating subsidiary Paradigm BioAviation, LLC. In addition Paradigm Technologies & Systems is the wholly owned technical arm of the Paradigm Energies Group ("Paradigm"). Paradigm was formed in 2010 as a stand alone extension of then 27 year old Convergence Aviation and Telecommunications Group, with the express purpose of advancing the reduction of aviation carbon emissions by developing and supplying renewable fuels for aviation – primarily Alternative jet fuel.

The Convergence Group was founded as Broadband Systems Ltd in 1983 by Alan Robinson to gain one of the original UK 11 pilot Cable Telecommunications franchises namely "Croydon Cable" to be awarded in 1983, and the group went on to franchise some 2.5 million homes in the UK alone. In 1989 the majority ownership of Croydon Cable was acquired by the USA multiple cable systems operator TCI, and in 1994 some 25% of the TCI/USWest new entity (including Croydon Cable) was sold in the first UK cable telecommunication company public offering for \$3.4 billion. The Convergence Group, chaired and majority owned by Alan Robinson, went on to diversify into international Wireless systems, Internet Data centers (IDC), and submarine cable, which included a \$600 million wireless, IDC and submarine cable project to Athens, Greece, for the 2004 Olympic games.

In 2003 the group diversified again into aviation with the design, operation and ownership of European airports, including the design and operation of the proposed new airport for the island of St Helena, South Atlantic, at a build cost of \$420 million.

Extensive research in the 2010-2012 period on suitability and availability of multiple feedstock (Algae, Jatropha, brown greases, woody biomass and solid waste, etc.) led to the decision by Paradigm to use Municipal Solid Waste (MSW) as the optimum feedstock for conversion to Green Power and Alternative Jet Fuel and in particular at the location of Bloomington-Normal, Illinois (BNI), with the closing of its McLean County landfill scheduled for 2017.

## 2. Alan Stuart Macdonald Robinson - Biography

Alan Robinson is a recognised businessman and entrepreneur in the fields of Aviation, telecommunications and media, with a 30 year track record as the Chairman, CEO or Managing Director of companies specialising in the licensing, ownership, design, build, operation and development of complex high technology and infrastructure projects of medium to long duration and high capital growth.

These have included the development and certification of new VLU aircraft & air taxi; the ownership, development and operation of privatised Regional Airports in Europe as well as the design, construction and operation of new-build airports; the franchising, design, installation and operation of large scale broadband telecommunications and submarine cable systems; the creation of local Cable and Satellite channels; and the creation of a national guide publication. As an innovative industry leader and founder of many small to medium sized companies (including Telewest), this has necessitated the ability to deal with national and international government licensing of infrastructure, complex international corporate structures, raising substantial equity and debt finance and to sit on the boards of many UK and European companies and trade Associations.

In March 2008, at the age of 56, Alan stepped down as the active CEO of West Midlands International Airport Limited and also as the Chairman and CEO of Convergence International Airports Organisation Limited ("CIAO"), to pursue more actively his passion for flying and photography in conjunction with looking for new business opportunities principally in Africa, America (North and South), Canada and Europe, for ERRAF Limited (an Anglo American Joint Venture company).

From 2004 to 2008 Alan was Chairman of CAFCO-C, airport group holding company and the CEO of Coventry International Airport in the West Midlands. Since 2004 CIAO has been active in the acquisition and development of a number of European regional airports being privatised as well as the design and construction of three new build airport projects in Spain, Italy and a new airport on the island of St Helena in the South Atlantic some 1,500 mile off West Africa.

Alan and his family lived in Greece from 1997 to 2003 where he was the President and Chief Executive Officer of Silk Route, Silk Route Telecommunications S.A., Convergence Communications of Greece E.P.E, and Convergence Ventures Ltd. Since 1997, Alan was based in the Mediterranean developing the business of Convergence in the region. For twentytwo years he was the founder, Chairman and Chief Executive of The Convergence Group Plc., (formerly European Broadband Systems Plc.) and is a Director of Convergence Group International S.A. ("CGI"). From January 1991 until January 1996, Alan was also Chairman and Chief Executive of Eurobell (Holdings) PLC. At that time,



Eurobell was the UK's eighth largest MSO operator holding franchises in Crawley, South Devon and West Kent.

Alan was a pioneer, owner and developer of the UK (and USA) broadband cable telecommunications industry for over 27 years and was responsible for franchising more than 2.5 million broadband homes in the UK. Upon his return to the UK after working in Athens, Greece for many years pre Olympic Games, he established a new presence in the UK regional airport industry when, in 2004, he founded CIAO and Convergence-AFCO Holdings Ltd ("CAFCO") in partnership with Airports Facility Company LLP ("AFCO") from the USA.

In 2005 CAFCO bid for and successfully acquired the ownership and operation of West Midlands International Airport at Coventry with some 800,000 passengers per annum.

His initial training experience was gained in the USA where he worked for, among others, Cable Telecommunications Inc, a business with mature networks and high penetration rates. He has wide experience of commercial cable TV operations and broadband technology.

In 1982, Alan founded Croydon Cable Television Limited, one of the 11 initial UK pilot cable franchises and, as Managing Director, was responsible for its successful construction and operation until the sale of the franchise to United Cable in 1987, which then became Telewest, listed in 1994 for £1.8 bn. During this same period he established and managed Cable Guide Limited, a national weekly cable TV programme listings magazine, formed Crystalvision, the award-winning local channel and Production Company, and the UK Cable operators buying group which is now the BRAVO channel.

In 1987 Alan founded West Midlands Cable Communications Limited ("WMCC"), and subsequently won franchises covering 620,000 homes, including the Black Country (at the time, the largest franchise in Europe) and Telford. From 1989 to 1991 he was the Managing Director of Goldcrest Communications Limited (Goldcrest Film) and he negotiated the profitable sale of the Black Country and Telford franchises to South Western Bell International Holdings Limited. At the same time, Convergence purchased the Crawley, Horley and Gatwick franchise -Eurobell.

From 1993 to 1999 Alan was a Director of the Cable Communications Association (UK) and for a period, held the position of Vice Chairman. From 1994 to 1997, he represented the UK on the European DVB Standards Board.

Alan has been the Chairman of the European Federation of Advanced Communications Technologies (EuroFACT), was a member of the Federation of Electronic Industries ("FEI"), the Trade Association (formerly EEA), and sat on the New Technologies Broadband Committee ("NTBC") and the European Information and Technology

Association ("EITA"); For more than 10 years his company managed or participated in leading edge technology research under the European Research into Advanced Telecommunications ("RACE") programme under DGXIII; He was on the Advisory Board of the Visionaire Vantage VLJ development programme for 4 years and has been involved in the Eclipse VLJ development of 1,100 aircraft for DayJet; He is a member of Airports Council International ("ACI"); European Business Aircraft Association ("EBAA"); the Institute of Directors ("IOD"); Aviation Club UK; Aircraft Owners and Pilots Association ("AOPA"); and Experimental Aircraft Association ("EAA"). He is on the Board of Managers of Wingedfoot Aviation Holdings LLC, and the Advisory board of DayJet Corporation (Delaware). He also sits on the Board of The Art of Living (Charlotte) and the Advisory Board of The Herring Houses of Dothan (Alabama).

### ***Biographical Details***

Address: 5 Hartington Close, Reigate, Surrey, RH2 9NL, UK

Born: London, UK, 16<sup>th</sup> August 1951

Status: Married since 1996.

Educated: Purley County Grammar School for Boys  
Croydon Technical College  
University of Texas at Austin

Directorships: See list attached

Qualifications: Diploma in Company Direction, Institute of Directors, 1986

BA Fine Art (Photography), University of Texas at Austin,  
Texas, 1985

3 GCE "A" levels (Maths, Physics and Applied Maths),  
Croydon Technical College, Surrey, 1969

9 GCE "O" levels from Purley County Grammar, Coulsdon,  
Surrey, 1967

Commercial Airline Transport Pilot and Helicopter Pilot since 1972

PADI Rescue diver & Y.M.C.A. Scuba Diver since 1972

The MOSCOW Conference on Law & Economic  
Cooperation, The Kremlin 1990

Associations: Institute of Directors ("IOD") London -since 1983

Institute of Advanced Motorists ("IAM") – 1968

Airports Council International ("ACI") – since 2006

Aircraft Owners and Pilots Association ("AOPA")- since 1997

Aviation Club UK – since 2006

Experimental Aircraft Association ("EAA") – since 1999

European Business Aircraft Association ("EBAA") –since 2004

Malibu, Mirage, Owners & Pilots Association ("MMOPA") –  
since 1999

Jersey Aero Club ("JAC") – since 1998

MMIG46 Europe –since 2001

Visionaire Corporation Inc., Vantage Aircraft Advisory Board 1997  
to 2001

DayJet LLC, Advisory Board – since 2006

Wingedfoot Aviation LLC, Board of Managers since 2004

The Cable Communications Association ("CCA") – 1983 to  
1999

Federation of Electronic Industries ("FEI") – 1986 to 2002

European Information & Technology Association ("EITA") –  
1996

Research into Advanced Communications in Europe ("RACE")  
programme under DGXIII – 1991 to 2000

Digital Video Broadcasting Standards Board – 1994 to 1996

European Cable Television Association – 1994 to 1999

The Art of Living Inc, USA, Board of Directors – since 2004

The Herring Houses of Dothan, USA, Advisory Board – since  
2006





### **3. Paradigm Management Team and Advisors**

Paradigm has assembled a core team of experienced executives from the aviation, telecommunications, chemical, petroleum and property/land development industries that have worked together for several years on the optimum means of entering the market for aviation biofuels. Collectively they have experience of owning, developing, constructing and managing major capital assets in the USA, UK and the rest of Europe, Middle East, South Africa and Australia. This experience includes both owning and/or operating airports, fixed base operations at airports, chemical plants, and international telecoms systems, as well as significant involvement in new technology development and integration from research through to commercialisation. In addition to the team members-noted below, operational and technical managers have been identified and are being utilized for the completion of specific tasks and will be brought on board as the initial project in Bloomington-Normal develops.

#### **Alan Robinson, President & CEO**

Alan Robinson, founder of the business, has a 30 year track record of success in the fields of aviation, telecommunications and media, where he has served as Founder, Owner, CEO, Chairman and/or Managing Director of companies specializing in the licensing, ownership, design, build, operation and development of high technology and infrastructure projects with medium to long duration and high capital growth. In the aviation field, Alan was involved as an owner/operator in airport design, construction, and ownership of both pre-existing privatized regional airports and new build airports. As an innovative industry leader and the founder of many businesses, he has considerable experience in handling national and international government relationships and complex international corporate structures, as well as international experience in raising equity and debt finance.

Alan has served on the boards of many UK and European companies and trade associations and has been a presenter at a number of bio aviation conferences.

#### **Michael Fearfield, Director – Business Development**

Financially qualified as a Chartered Cost & Management Accountant who after 5 years of financial experience elected to move into general management in the chemical industry. During a 30-year period working for UK, US and South African public companies, he had profit responsibility for chemical businesses in many parts of the world, including start-ups, acquisitions, restructurings and disposals. The industry



sectors covered included phosphates, surfactants, agricultural chemicals, speciality chemicals and pharmaceutical fine chemicals; operations managed ranged in size from a start-up with 50 people to an international division with 3,500 employees.

Extensive experience in the private equity field and was an investor in and director of a pharmaceutical chemical contract manufacturing and development company founded by Global Healthcare Partners, an associate of DLJ Merchant Banking.

Served as a director on many boards and was a member of a number of trade associations. And he has worked with Paradigm and the Convergence team since 2009.

#### **Robert Fazzini, - President Designate**

Robert earned his B. S. degree from the local Illinois Wesleyan University in Economics and Insurance plus graduate work at the University of Chicago MBA program. Taught classes at two community colleges and several Illinois Bankers' schools. Served as a national banking advisor for the American Bankers' Association travelling to do 2-3 day media tours in major media markets throughout the country to do radio, television and editorial board interviews for eleven years.

Retired in 2011 as Market Area President for Busey Bank in McLean and Livingston counties. Gained a broad level of local leadership experience over 26 years including past presidency of the McLean County Chamber of Commerce and the McLean Museum of History, and has recently served as a City of Bloomington Alderman.

In addition to financial expertise, teaching experience and leadership skills, he brings a broad perspective to the company from having lived in three countries (Holland, Greece and Taiwan) with his family while working for a major Chicago money center bank.

#### **Charles Keene, FCA- Finance Director Designate**

Charles Keene is a Chartered Accountant with extensive experience across large, medium and small companies including Grand Metropolitan plc, Tate and Lyle plc and Bristol and West Building Society.

He has a wide range of financial, managerial and commercial skills having held positions CFO in organisations that have included turnaround situations, systems implementation and the creation of well-structured financial reporting

Charles also has experience and capabilities in raising finance for start-up companies, restructuring and implementing internal systems and procedures and working with





business founders to formulate business plans and make their companies investment ready.

Charles is active in advancing responsible environmental initiatives through his participation in a number of industry associations and by participating in the legislative process. He has worked with the Paradigm and Convergence team since 2005

#### **Gail Farrin Robinson, Projects Director**

Gail Farrin Robinson specializes in managing large multi-disciplined capital projects. Gail has extensive experience at main board level working for large and international companies in the areas of general management, project management, bid management, contract negotiations, operations management and manpower management. During her more than 30 years working in the UK, Europe and the Middle East, Gail has acquired extensive skills in multi-disciplinary engineering project management in the areas of heavy civil engineering, electrical generation, transmission and distribution contracting, broadband telecommunications and cable television industries and aviation industries. Gail has worked as a senior manager with other members of the Paradigm and Convergence Group team for 25 years.

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

Steven Johnson has a Ph.D. and M.S from Stanford University, a B.S. in Chemical Engineering from the University of Illinois and a B.S. in Chemistry from Illinois Wesleyan University.

He has made a number of presentations in the USA, including to the American Chemical Society and the Society of Petroleum Engineers, and overseas in Singapore and Madrid, has produced 5 joint papers and is the holder of 5 joint patents mainly in fields of direct or indirect relevance to the fields of interest to Paradigm.

His industrial career included 14 years with ARCO progressing from Senior Research Engineer at the Synthetic Fuels, Coals and Mineral Research Group to Technical Manager of Anaconda Minerals Company to Principal Research Engineer at the ARCO Oil and Gas Company. He then spent 5 years as Director of Process Research and Advanced Technology at Energy BioSystems Corp with responsibility for a wide range programmes and projects including collaboration with MIT and other Universities in fields of relevance to Paradigm. Subsequent work has involved agricultural feedstock conversion to biodiesel. He is a retired U.S. Naval officer. He joined the Paradigm team in 2012

#### **University of Illinois**

The Illinois Sustainable Technology Center (ISTC) is a division of the Prairie Research Institute at the University of Illinois at Urbana-Champaign. ISTC is a non-regulatory agency that performs research, spreads awareness, encourages job development and



facilitates implementation regarding practices, technology and systems that reduce waste, conserve natural resources, and improve sustainability.

ISTC desires to utilize its expertise to develop innovative solutions for the management of MSW within the state of Illinois. ISTC recognizes the value of collaborating with Illinois based corporations that are engaged in the development of new technologies and new approaches that will improve the management of MSW within the state of Illinois.

As a result, Paradigm and ISTC are entering an MOU as both ISTC and PBA desire to collaborate in the establishment of a Center for Waste and Materials Management (CWMM) within the state of Illinois that will be co-located with Paradigm in the IBR facility. The goals of the CWMM include, but are not limited to the following:

- Serve as a pilot / demonstration scale test facility for new technologies to handle, sort, and utilize MSW
- Provide a facility and forum for state and local governments and agencies to understand new approaches to the handling and management of MSW
- Develop approaches that will enable Illinois to maintain a leadership position in the management of waste generated from residential and commercial sources

The MOU addresses such issues as.

- Co-location within the IBR facility, with Paradigm allotting sufficient space for the CWMM to conduct its operations including access to classrooms/lecture space and laboratories, plus an area of high space on the plant floor for any additional pilot works.
- The operation of the CWMM and the provision of the research and development (R&D) staff for the CWMM.
- ISTC will provide a range of analytical and operating audit services to PBA on a case-by- case basis.

ISTC may perform the following tasks:

- Analysis of local supply chain - MSW, agricultural waste, food waste, tires, etc.
- Sustainability analysis and Economic Impact Study
- Defining the scope of the “Zero Waste to Landfill” centre with identification and establishment of complementary industrial users on site for the MRF & Gasifier outputs.
- Co-joined operation of the 15 tpd Gasifier to GTL semi-commercial pilot

**Southern Research Institute-** operates a 3 and 10 ton per day pilot plant in Durham, North Carolina. It 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** - Andrews has served as the engineer of record for all landfills located in the Bloomington/Normal area since 1973. It has significant successful experience in the community, are specialists in obtaining permitting and zoning for landfills and related services such as a transfer station.

**Mueller Anderson & Associates** Legal specialists in the permitting of Regional Pollution Control Facilities (landfills and transfer stations) and permitting with the IEPA. They have worked on a majority of such applications in the State of Illinois and work in close collaboration with Andrews Engineering.

**Hensel-Phelps Construction Company-** A major US construction company headquartered out of Denver, CO, with a 75 year track record of providing EPC services for the federal government as well as a multitude of national and international clients achieving annual sales in excess of \$3 Billion. Committed to becoming a major contractor in the area of renewable energy plants.

**Tetra Tech Inc.** Design Engineers - Tetra Tech is a leading provider of consulting, engineering, program management, construction management, and technical services. The Company supports government and commercial clients by providing innovative solutions focused on water, environment, energy, infrastructure, and natural resources. With more than 14,000 employees worldwide, Tetra Tech's capabilities span the entire project life cycle.

**Broadway Capital Inc.- New York** - Structuring, placement and administration of "RTG" Bond for full Project Financing of c \$120 million.

**Stern Brothers & Co – St. Louis** - Advice and placement of second (tax exempt) bond issue.

**Accountants - Bloomington-Normal** - Sulaski & Webb, CPA's

**Legal Advisors USA– Bloomington-Normal Illinois –**

**Regulatory & Compliance USA:** Mueller Anderson & Associates

**Corporate USA:** Hartweg Turner Wood & DeVary, P.C.

**Legal Advisors UK** - Charles Russell LLC – London

**Accountants & Auditors UK** – Shipley's LLP – London



#### 4. Summary of the Paradigm Integrated Bio-Refinery (“IBR”) Processes

The **Paradigm Bio-Aviation (“Paradigm”) IBR**, which it is to be constructed at Bloomington-Normal, Illinois (“BNI”), will comprise four separate, but highly integrated processes, namely:

1. **A Materials Recovery Facility (“MRF”)** to extract all recyclable materials and process Municipal Solid Waste (“MSW”) to clean and prepared organic feedstock;
2. **A Gasification Plant** to reform the organic carbon feedstock from the sorted MSW into “Syngas” - synthetic gas;
3. **A Green Power Generation (“GPG”) Plant** using Syngas to produce electric power;
4. **A Gas to Liquids (“GTL”) Plant** to convert pure Syngas into renewable liquid fuels.

The first three processes constitute a modern, but conventional **Waste-to-Energy (“W2E”)** plant, which is **Phase 1** of the proposed two stage build, to be followed within 12 months by the **Phase 2 GTL facility**. All of the processes will be contained within closed buildings and all discharges including the exhaust gases from GPG process will be in accordance with EPA requirements.

The traditional method of disposing of MSW has been to deposit wholesale into local landfill sites, which even when operated to modern EPA standards, can create environmental problems including the leakage of toxic leachate, in addition to the escape of methane gas. With greater public awareness to these environmental problems restrictions placed on landfill disposal of MSW in European countries has increased significantly, to the point where a total ban on landfills now exists in many countries including Japan, where some 42 “Zero waste” plants operate.

This “zero waste” to landfill culture has accelerated the development of more advanced methods of sorting out the valuable recyclable materials and then disposing of the residual organic biomass through advanced gasification technology to produced power, renewable liquid fuels and synthetic chemicals. The advanced MRF process proposed for BNI will separate all recoverable recyclable materials from the dirty MSW stream and leave an organic biomass material in a processed form which can be converted into syngas or used as Specified Recovered Fuel (“SRF”) for mixing with coal in cement kilns and power station to significantly reduce carbon emissions.

Gasification is a general term used to describe a variety of thermal processes, including crude incineration or advanced pyrolysis to convert carbonaceous material including

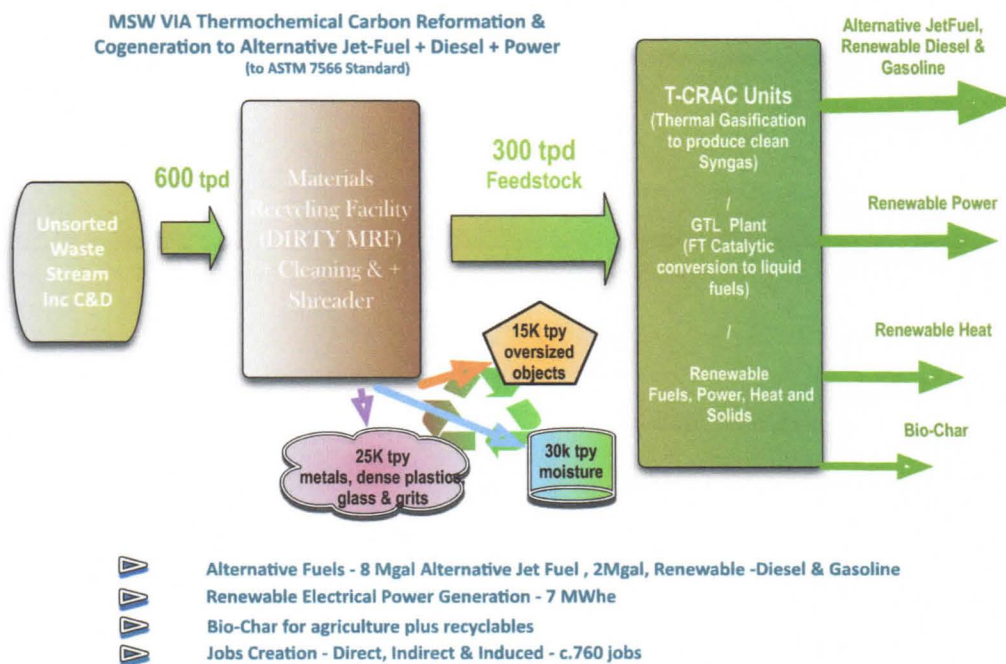


biomass from MSW into either just heat or alternatively to a hydrogen rich and clean gaseous state called Syngas. The EPA has, however, now recognized the advanced Gasifier of the type Paradigm will employ, as a distinct environmentally superior and a different process to incineration for the conversion of biomass to Syngas. The use of clean Syngas, like natural gas, is varied from just the production of heat; to powering turbines or reciprocating engine to produce electric power; or converted into liquid fuels or chemicals by GTL processing.

The Phase 2 GTL plant is termed **Fischer-Tropsch ("FT")**, is widely used in modern crude oil refineries. It was originally developed in Germany in the 1920's and was utilised by Germany during WWII, to produce large volumes of kerosene fuels from coal. Subsequently, South Africa relied upon this process, as used by SASOL, to produce their gasoline and Jet fuel throughout the apartheid years – they also produced a wide range of chemicals too. New lower volume and higher efficiency FT processes of the type required by Paradigm are now in the final phases of development and commercial deployment. Paradigm is working with Southern Research Institute, Durham, NC, to narrow the output of the FT equipment to focus on Alternative jet fuel and renewable diesel output only.

With the increasing availability of both Natural Gas and Syngas, major engine manufacturers such as Caterpillar have developed more efficient units for power generation from the MSW feedstock, which will be utilised by Paradigm

#### Full BNI Commercial Plant- 300 tpd





## 5. Summary of Financial Details of the BNI Project

1. Funds expended in 2010-2014 period on research and development Phase (RDP)BNI development.....**\$1,928,000**
2. Funds to be expended in late 2014 – 2015 period on Permitting and Design Phase (PADP) in BNI.....**\$4,238,000**
3. Funds to be expended in 2016 – 2018 on Phase 1 “MSW to Power and SRF” –IBR plant construction, commissioning & operation.....**\$72,000,000**
4. Funds to be expended in 2018–2019 on Phase 2 “MSW to Alternative Jet Fuel” –GTL plant construction, coms & op.....**\$60,000,000**

***Note: There has been no up-front funding requested from local governments for the risk of \$1,928,00 expended in this private enterprise to date.***



## 5. Letters of Support

The major funding of the Paradigm \$132 million IBR facility in Bloomington-Normal will be through specialised Project Finance in form of Risk Transfer Guarantee (“RTG”) bonds. A lengthy and thorough due diligence process is a key component for accessing and securing such bonds and will necessarily address each of the following criteria: economic, environmental, technical, sustainable and community acceptable. It has therefore been essential for Paradigm assess the support of Bloomington-Normal and more generally the State of Illinois from the outset.

To this end Letters of Support have been requested from community leaders based upon: Job Creation, Reduced Carbon Emissions, Community Reputation Enhancement, and Reduced Dependency on Foreign Oil. The response to date has been increasingly positive as the IBR project, with all of its implication and ramifications for the clean disposal of MSW and the creation of Green Power and Alternative (synthetic) fuels have been reviewed and better understood.

The following letters of support have already been received from key figures and a further Letter of Support is expected from the Governor’s office based upon a recent meeting with Matthew Glavin, Deputy Director in the Office of Business Development at the Illinois Department of Commerce & Economic Opportunity:-

- i) **Jason A. Barickman, State Senator**
- ii) **Tari Renner, City of Bloomington Mayor**
- iii) **William E. Brady, State Senator**
- iv) **Kevin C. O’Brien, Director of Illinois Sustainable Technology Center at University of Illinois**
- v) **John Grabo, Chief Executive Officer of B-N Economic Development Center**



## **7. Appendix A**

- a) Description of the Paradigm IBR processes and facility**
- b) Paradigm's answer to Aviation Emission challenges in diagrammatic form**
- c) Comparative Analysis of Financial Benefits to BNI of Paradigm IBR Facility**
- d) Reprint of an article about Alan Robinson, as a client from the London Chartered Accountancy firm Shipleys LLP.**





## **7(a) Proposed Paradigm BioAviation Integrated Bio-Refinery Processes**

The standard municipal solid waste (MSW) disposal method in the United States has primarily been the landfill. Though modern landfills are required to be sealed to prevent material from escaping, they are still problematical: toxic materials such as leachate can and do occasionally penetrate the bottom seal and gases such as hydrogen sulfide and methane, created in the landfill, must be vented and collected for use or flaring. In most European countries, landfills are either prohibited altogether or severely restricted by law in decreasing the volumes deposited towards an overall objective of “zero waste” to landfill.

As stated by our CEO, Alan Robinson, “The use of incineration even in America goes back to early 1900's and was primarily used to dispose of waste in cities and perhaps make use of heat generated as a byproduct. It was a relatively simple process and was not driven by the present day demands to keep the environment clean or to generate renewable fuels.

The development of true gasification plants for reformation of carbon molecules to higher grade renewable energy and alternative jet fuel is a complex and demanding process that requires more sophisticated equipment and skilled operation, which equates to greater capital investment, higher quality of management and ultimately standards and regulations from government to operate against in a unified and replicable manner.

So this process required time, investment in research, creation of standards and the concerted interest of government, economic and environmental drivers to make the industry happen. Only now are most of these ingredients coming into alignment and thus the move towards genuine gasification for carbon reformation instead of incineration is commercially feasible.

What is also becoming clear is that old style incineration plants will not be relicensed or replaced with new incineration plants once their 20+ year lifespan expires, and that is starting to cause the very companies who have profited greatly from constructing and/or operating incineration plants to start to talk about moving into true gasification. This was evident with a number of large-scale incineration companies at the RWM, show in Birmingham this September, who are showing gasification as the next step in their evolution, but are only just really looking at it on a commercial basis. That I think, is where we are today.”



Paradigm BioAviation (PBA) proposes to use tested and proven advanced technologies in an Integrated Bio-Refinery (IBR) to process MSW waste generated in the Bloomington-Normal area into green power and alternative jet fuel. The IBR will integrate four existing advanced technology process: a mixed waste Materials Recovery Facility ("MRF") to extract recyclable materials; Gasification of the organic materials; Green Power generation, and; a Fischer-Tropsch gas-to-liquids process to synthesize Alternative Jet Fuel and renewable diesel – all enclosed and under one roof.

Materials recovery facilities (MRF) come in two general types – clean MRFs or mixed waste MRFs ("dirty MRF"). Midwest Fiber operates a clean MRF which accepts only uncontaminated recyclable materials. A mixed waste MRF accepts the complete municipal solid waste stream and separates it into recyclable categories and a non-recyclable fraction - garbage. The non-recyclable material will consist of organic materials such as kitchen, garden, and landscape wastes, woody waste, fabric, and the like. These wastes could be sent to a landfill, incinerator, or gasifier. In the proposed IBR, Paradigm will build a state of the art mixed waste MRF to feed gasifiers.

Gasification, the next step in the evolutionary development of incineration/combustion technology, is a thermal process that converts carbonaceous materials to "Syngas" which may be combusted in turbine or reciprocating natural gas type engines to produce electricity, or converted into fuels or chemicals in a gas-to-liquids process. Germany used gasification of brown coal to feed its synthetic fuels plants in WWII. Paradigm plans to generate syngas for electricity generation and fuel production.

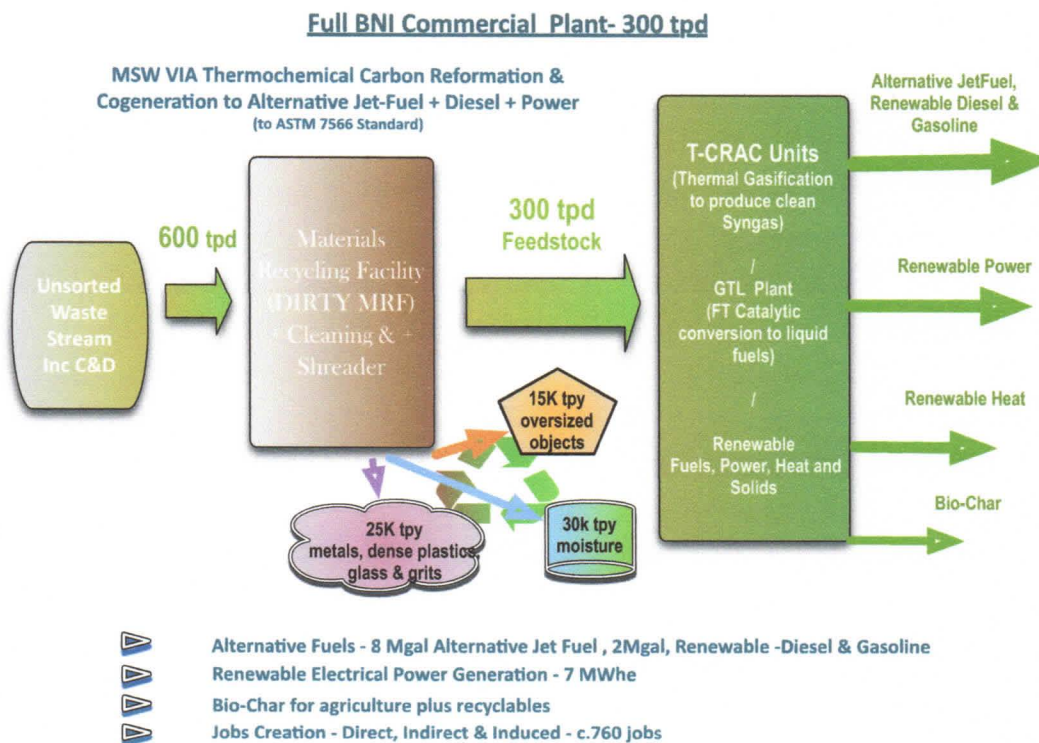
The Gas-to-Liquids plant planned for the B-N IBR will be based on miniaturized Fischer-Tropsch technology developed by German scientists in the 1930's and used today in petroleum refineries to produce liquid fuels from syngas. Such synthetic fuels were produced extensively by the Germans in WWII and by SASOL of South Africa after 1950. Most South African Jet fuel, diesel and gasoline is synthetic even now. Paradigm is working with its teaming partner Southern Research Institute, Durham, NC, in its development of improved catalysts.

Electric Power from Paradigm's IBR will be generated by natural gas engines running on syngas. A number of companies, including Caterpillar and GE, have natural gas engines optimized for syngas use.

While all of these technologies are commercial and in use today – few plants have yet to integrate all processes into one efficient IBR facility. With encouragement and recent funding initiatives from the DOD, other companies such as Fulcrum BioEnergy and Red Rock BioFuels are now starting to do this. Paradigm plans to integrate these individual and separately proven processes into a single facility at its Bloomington-Normal



Integrated Bio-Refinery. Below is a MSW with Gasification to Alternative Jet Fuel schematic.



### Existing Process Facilities in The United States

There are 84 waste-to-energy incineration facilities in the US and about 420 in Europe. Old style incineration plants may not be relicensed when their 20 year lifespan expires.

Some of the mixed waste MRFs operating in the US are in:

- San Mateo County, CA (South Bayside Waste Management Authority SBWMA)
- San Jose, CA (The GreenWaste MRF)
- Placer County, CA (Western Placer Waste Management)
- Whittier, CA (Puente Hills MRF)
- Athens Disposal (City of Industry, CA)
- Sunnyvale SMaRT Station (Sunnyvale, CA)
- Van der Linde Recycling (Troy, VA)
- Total Waste Recycling (Roscoe, IL)

There are a variety of Gasifiers operating commercially on a variety of feeds in the US:



ICM – operates a 200 ton per day (tpd) demonstration plant (included here for its capacity) in Harvey County, KS. It has been tested on feeds ranging from tree bark, corn stover, and poultry litter to MSW and RDF.

FERCO – in Burlington, VT operates a gasifier on 200 tpd to 350 tpd wood chips to produce a medium BTU gas.

Energkem - operates plants in Westbury, Quebec (on used utility poles), Edmonton, Alberta (250 tpd sorted MSW), and Pontotoc, MS (using MSW and wood waste). Energkem uses the syngas in a fermentation process to produce methanol, ethanol, and other chemicals.

PHG – operates a 12 tpd gasifier on wood waste and municipal sludge to produce steam for power generation.

ITI-Energies –ITI operates a successful gasifier-to-power facility in Nottingham, UK. The syngas powers generators to produce c.12 megawatts of net electrical power.

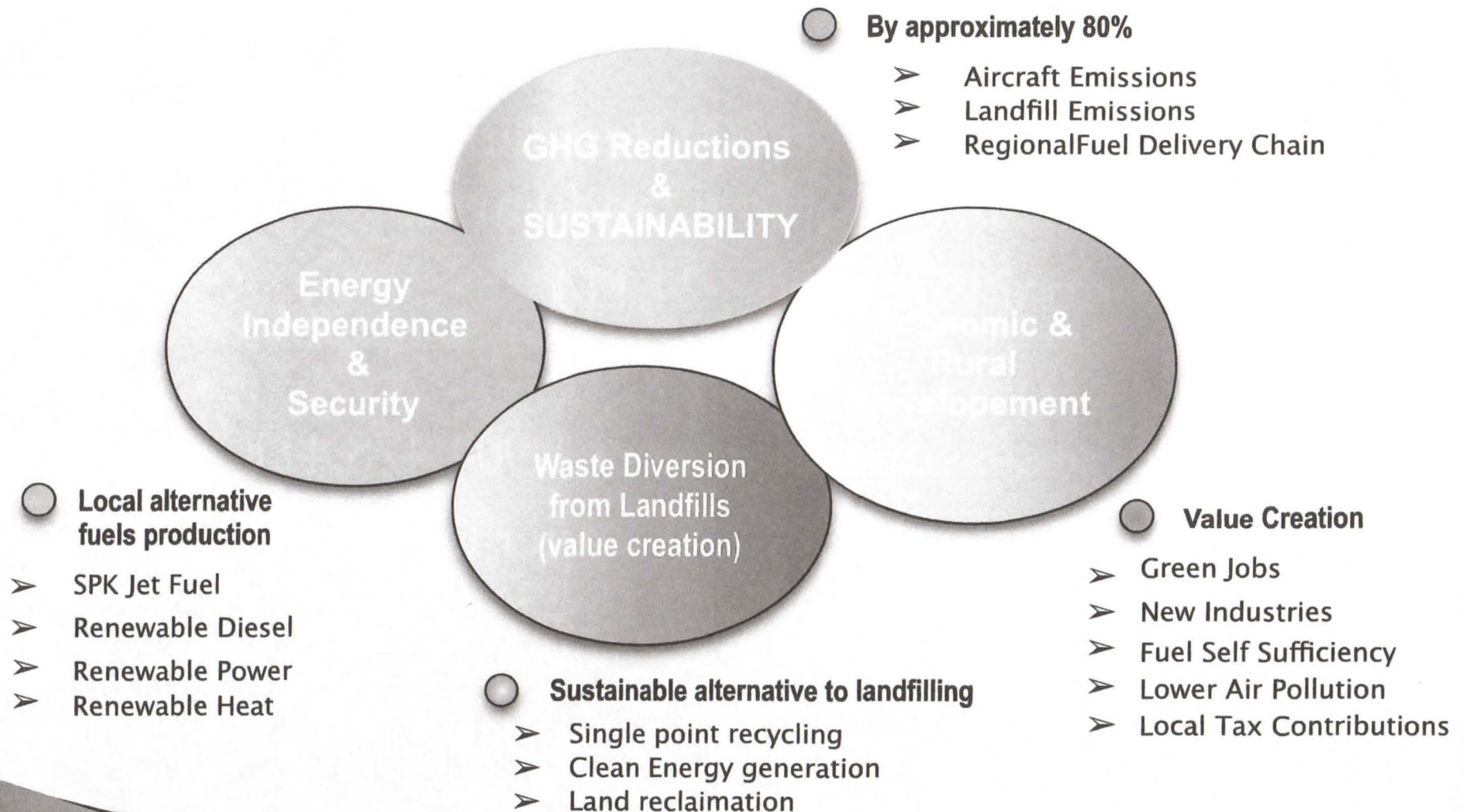
TRI – ThermoChem Recovery International has operated a gasifier at Trenton, Ontario on black liquor for over six years. The gasification process has also been tested with MSW feed in a 4 tpd pilot for over 1000 hours. Those tests included an integrated GTL fuels facility. The DOE has recently announced partial funding for three facilities using TRI gasification technology to produce fuels from wood waste and from MSW.

Syntroleum had a plant in Tulsa, OK that would produce up to 75 million gallons of diesel from animal and waste fat. Though the plant was closed in 2010 for financial reasons, the company and its assets have been purchased by Renewable Energy Group, Inc (headquartered in Ames, Iowa).

Additional information on these companies and facilities is available on the Internet.



# Paradigm's answer to aviation emissions challenges



**Comparative Analysis of Financial Benefits to BNI with operation of Paradigm IBR Facility**

Operational Year			1	2	3	4	5	6	7	8	9	10
Period comencing	% increase per annum	up to Feb 2018	01/03/2018	01/03/2019	01/03/2020	01/03/2021	01/03/2022	01/03/2023	01/03/2024	01/03/2025	01/03/2026	01/03/2027
MSW Normal TPD		35	35	35	35	35	35	35	35	35	35	35
MSW Bloomington TPD		85	85	85	85	85	85	85	85	85	85	85
MSW BNI Combined TPD		120	120	120	120	120	120	120	120	120	120	120
REPUBLIC EXISTING CONTRACT WITH BNI (as signed on February 17, 2014)												
Tipping Fee TPD	3.0000%	\$ 50.01	\$ 51.51	\$ 53.06	\$ 54.65	\$ 56.29	\$ 57.97	\$ 59.71	\$ 61.51	\$ 63.35	\$ 65.25	\$ 67.21
Daily cost to BNI	Days in yr	\$ 6,001	\$ 6,181	\$ 6,367	\$ 6,558	\$ 6,754	\$ 6,957	\$ 7,166	\$ 7,381	\$ 7,602	\$ 7,830	\$ 8,065
Cost per yr to BNI at days/yr	286	\$ 1,716,343	\$ 1,767,823	\$ 1,820,858	\$ 1,875,484	\$ 1,931,748	\$ 1,989,701	\$ 2,049,392	\$ 2,110,873	\$ 2,174,200	\$ 2,239,426	\$ 2,306,608
MSW trucking cost/ton to Pontiac/Clinton	\$ 13.50	\$ 13.50	\$ 13.64	\$ 13.77	\$ 13.91	\$ 14.04	\$ 14.18	\$ 14.32	\$ 14.47	\$ 14.61	\$ 14.75	\$ 14.90
Additional cost to BNI post landfill closure		\$ -	\$ 467,953	\$ 472,586	\$ 477,266	\$ 481,992	\$ 486,764	\$ 491,584	\$ 496,452	\$ 501,368	\$ 506,332	\$ 511,346
Total cost to BNI with Republic	per annum	\$ 1,716,343	\$ 2,235,776	\$ 2,293,444	\$ 2,352,750	\$ 2,413,740	\$ 2,476,465	\$ 2,540,976	\$ 2,607,325	\$ 2,675,567	\$ 2,745,758	\$ 2,817,954
PARADIGM HOST & FEEDSTOCK WITH BNI (as negotiated at October 08, 2014)												
Tipping Fee TPD	0.0000%	N/A	\$ 49.50	\$ 49.50	\$ 49.50	\$ 49.50	\$ 49.50	\$ 56.93	\$ 56.93	\$ 56.93	\$ 56.93	\$ 56.93
Daily cost to BNI	Days in yr	N/A	\$ 5,940	\$ 5,940	\$ 5,940	\$ 5,940	\$ 5,940	\$ 6,832	\$ 6,832	\$ 6,832	\$ 6,832	\$ 6,832
Cost per yr to BNI at days/yr	286	\$ -	\$ 1,698,840	\$ 1,698,840	\$ 1,698,840	\$ 1,698,840	\$ 1,698,840	\$ 1,953,838	\$ 1,953,838	\$ 1,953,838	\$ 1,953,838	\$ 1,953,838
MSW trucking cost/ton to Pontiac/Clinton	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Additional cost to BNI post landfill closure		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total cost to BNI with Paradigm	per annum	\$ -	\$ 1,698,840	\$ 1,698,840	\$ 1,698,840	\$ 1,698,840	\$ 1,698,840	\$ 1,953,838	\$ 1,953,838	\$ 1,953,838	\$ 1,953,838	\$ 1,953,838
Savings pre Host Agreement rebate		N/A	\$ 536,936	\$ 594,604	\$ 653,910	\$ 714,900	\$ 777,625	\$ 857,138	\$ 917,752	\$ 985,994	\$ 1,056,184	\$ 1,128,381
Savings pre Host w/no trucking costs		\$	\$ 68,983	\$ 122,018	\$ 176,644	\$ 232,908	\$ 290,861	\$ 359,554	\$ 421,300	\$ 484,626	\$ 549,852	\$ 617,035
Paradigm IBR throughput in TPD		0	600	600	600	600	600	600	600	600	600	600
Host Fee per ton paid to BNI w/inflation	10.00%	\$	\$ 1.40	\$ 1.40	\$ 1.40	\$ 1.40	\$ 1.40	\$ 1.54	\$ 1.54	\$ 1.54	\$ 1.54	\$ 1.54
Paradigm Host Agreement Payments to BNI	per annum	N/A	\$ 240,240	\$ 240,240	\$ 240,240	\$ 240,240	\$ 240,240	\$ 264,264	\$ 264,264	\$ 264,264	\$ 264,264	\$ 264,264
Total Savings w/Host fee rebate	per annum	N/A	\$ 777,176	\$ 834,844	\$ 894,150	\$ 955,140	\$ 1,017,865	\$ 1,085,402	\$ 1,157,752	\$ 1,235,994	\$ 1,319,184	\$ 1,407,381
Savingsno trucking w/Hostfee rebate	per annum	N/A	\$ 309,223	\$ 362,258	\$ 416,884	\$ 473,148	\$ 531,101	\$ 590,818	\$ 651,300	\$ 717,626	\$ 789,852	\$ 867,035
Financial Benefit to BNI over 1st 10 years (excluding gains from renewable fuels & power)		\$	9,418,888									
Savings as % on Republic existing contract (with future trucking cost)			35.05%									
Financial Benefit to BNI over 1st 10 years (Assuming no additional trucking charges from Republic )		\$	4,525,244									
Savings as % on Republic existing contract (with NO future trucking cost)			20.59%									





# CLIENT NEWS

## HIGH FLYERS

Air transportation of passengers and freight has increased, is increasing, and will continue to increase. Air passenger traffic has grown by 276% since 1983, and in the UK the current annual passenger traffic of 160 million is predicted to grow to 600 million by 2030.

Across Europe the rapid rise of low cost carriers such as EasyJet and Flybe is contributing to this expansion, and also creating demand for new, vibrant, regional airports. The traditional 'hub' airports such as Heathrow and Gatwick do not suit these airlines, because they are already operating close to capacity, they are expensive, and passenger movement in and out is slow.

### *The new entrepreneurs*

This is where Alan Robinson and Gail Farrin Robinson come in. Through their joint venture company CAFCOHL they have already bought Coventry Airport (in January this year), and they aim to become one of Europe's leading multiple regional airport operators within the next three to five years.

Alan's life-long love affair with aviation, his entrepreneurial skills and experience in financing, combined with Gail's talents and practical expertise in managing major infrastructure projects, make a winning partnership.

In addition, their joint venture partnership with AFCE (Aviation Facilities Company Inc.) gives them access to the know-how of a leading US company in the field of airport property management.

To accelerate their acquisition programme they recently established a £200 million specialist property fund ERRAF (European Regional Regeneration & Aviation Fund), which is a Jersey 'Expert Fund'.

### *The new opportunities*

Alan and Gail have observed and researched the fundamental changes in aviation regarding the needs of both carriers and passengers in Europe, and identified the opportunities to create their own solutions in this market.

**Alan Robinson with his Dlx 500 Jet Prop.**



The success of low cost carriers is creating an increasing demand for region-to-region (rather than region-to-hub, or hub-to-region) services, avoiding the slow and busy changes at the traditional hub airports. This demand is driven by business travellers who want to travel as quickly as possible between points A and B, by the increasing number of second home owners, and by the expansion of the 'short breaks' holiday market, particularly to destinations in Eastern Europe.

An emerging trend is the popularity of air taxis, carrying small numbers of people (usually on business) between locations which do not have regular scheduled services. Alan, who is an experienced pilot himself and currently flies around 200 hours a year, understands perfectly the different needs of such services, which will increasingly change the pattern of local travel, and which are currently not well catered for at many airports.

Above all, the passengers themselves are expecting more. "No-one making a short flight of two or three hours wants to spend twice that time travelling to and from the airports or walking to boarding gates," explains Gail. "All over Europe passengers prefer to use their local airports when they can, and there is huge scope to develop these and provide the services that passengers want."

### *The new vision*

Regional airports have historically been owned and operated by local authorities which do not have the management experience, or the necessary investment capital, to transform their local airports into the flexible and efficient facilities that will be required in the future. Gail explains

how CAFCOHL will meet the demand for safe, fast-turnaround, minimum fuss, maximum throughput airports:

"We appreciate that client demands are changing, and we can meet these demands, from both airlines and passengers, in economic and efficient ways that will keep costs down, while providing safe airports and the services that clients want.

"We are developing generic designs which will enable us to provide infrastructure services, such as accounting and IT systems, which will achieve economies of scale while being customised for local needs. We don't want to develop 'clone' airports across Europe; we intend to develop super-efficient regional airports which reflect local cultures and expectations while benefiting from the management efficiencies we can provide."

### *The partnership*

Alan and Gail have been in business together since 1989, having met while working in the Cable TV industry (Alan founded Croydon Cable/Telewest UK and Eurobell). They have three children, and divide their time between a flat in Reigate, a farm in Devon, and Jumbolair, a private airport in Florida, where they are building a house and hangar on a three acre plot, near to John Travolta's home where he keeps his Boeing 707.

"We bought the farm in Devon for relaxation," says Gail, "and we love it. No-one in their right senses buys a farm, keeps water buffalo and deer, and hopes to make a profit nowadays!"

For further information please see [www.cafcohl.com](http://www.cafcohl.com) or contact Gail Farrin Robinson by telephone at 01647 24657 or e-mail [Gail.FarrinRobinson@cafcohl.com](mailto:Gail.FarrinRobinson@cafcohl.com)