

## ISSUE 12

# FUELLED A GREEN REVOLUTION

With environmental concerns such as carbon emissions and fuel depletion becoming a major focus, aviation companies around the globe are developing innovative aircraft technologies, sustainable processes and alternative forms of fuel moving towards greener, cleaner skies. *Bridging Skies* speaks with Marvyn Lim, Executive Advisor to the Chief Technical Officer (CTO) at the European Aeronautics Defence and Space Company (EADS), on their mission to mass produce biofuel derived from microalgae and how they hope that biofuel will eventually be adopted as the cleaner fuel option for aircraft of the future.

### Why biofuels now? Why microalgae in particular?

There is a great amount of concern regarding climate change issues today and this is demonstrated by myriad international conferences that address them, such as the Kyoto and Copenhagen summits. The aviation industry takes a keen interest in these discussions and finds ways to reduce its carbon footprint globally.

EADS contributes to this global climate change movement through research into not just eco-friendly future aircraft design but also alternative forms and sources of sustainable fuel for the industry. Besides looking at ways to make existing kerosene-run aircraft more fuel efficient, we also delve into developing biofuels that is commercially compatible to be used industry-wide.

While past research has focused on food sources such as corn and sugarcane to make biofuels, we turned our attention to algae. We feel that algae is a viable source because it is durable and easily produced. Moreover, with the right technology, algae oil can be converted successfully into a sustainable form of kerosene fuel that rivals conventional Jet-A1 aviation fuel and performs just as well.

### How far along has this project progressed?

The biofuels movement has now gone global. EADS is riding the wave of this interest and has collaborated with various international partners to research and assess the potential for microalgae to be a renewable source of fuel for aircraft. We are also investigating the conversion of algae oil to kerosene for use as jet fuel.

The focus of the research in each country is different as we leverage their centres of excellence and laboratories and tap on their differing expertise to ensure the highest rate of success.

EADS is leveraging the best minds from various industries to find the best solution in meeting technological requirements for microalgae biofuel development.

Working with companies that supply the algae, we ensure that they have the right equipment, such as a photo bio reactor to create an optimal environment, so that the right algae can grow fast and in great quantities. This ensures a constant supply of high quality algae that is crucial in the research process. Beyond raw materials, we are also working with another group which looks into ensuring the commercial viability of the venture through making the industrial conversion and extraction process more cost-effective. Another one of our partners looks into developing engines that can efficiently consume this biofuel.

All in all, the scope of the EADS project is wide-ranging as it brings together several international bodies from diverse sectors to make this project successful and cost-effective.

### **What are the challenges ahead for this project?**

We are always working towards pushing the envelope for this project – looking for better, more efficient and effective methods in the search for sustainable biofuels. We constantly endeavour to find better algae strains to work with and experimenting with variables to find the right dose of light, nutrients and anti-bacterial properties to ensure that they multiply greatly so that the harvest would yield an abundant amount. We also continue to improve the chemical process to convert microalgae into biofuel by working on better chemistry methods and catalysts so that the manufacturing process is more cost effective. Most importantly, we always have our eye on the efficiency of the fuel to ensure that it behaves and functions in exactly the same way as conventional Jet-A1 fuel used today.

### **How ready is microalgae fuel for commercial use?**

Riding on the success of the trial run of the Diamond DA42 New Generation light twin aircraft (Diamond 42) running on microalgae biofuel at the ILA Berlin Airshow in 2010, I would say that the ultimate goal is to fly one of our Airbus aircraft using the same microalgae biofuel and have it eventually adopted for commercial use.

Unfortunately right now, it is still quite expensive. With our constant research into finding solutions to tackle the challenges in this project, we hope to eventually match the current aviation fuel price. This is why we need to team up with like-minded parties to come together to look for ways to make the microalgae fuel prices as low as possible in the drive for a greener future for aviation.

I believe microalgae biofuel will be more affordable in the future, with prices that can compete with conventional oil as biofuels become more readily available for use.

**How does microalgae fuel fit into the global climate change movement?**

One immediate benefit is that microalgae biofuel is a good and effective replacement for jet fuel should fossil fuel eventually run out. Secondly, because of its higher energy content, aircraft need only use a smaller amount of fuel, thus lowering fuel consumption and wastage. Beyond its viability and ease of production, what makes microalgae biofuel especially environment friendly lies in the manufacturing process. Microalgae “uses” natural resources such as sunlight, water and minerals to grow by photosynthesis, while absorbing the greenhouse gas, carbon dioxide. Therefore, by using microalgae biofuel as an alternative to conventional jet fuel, the aviation industry can effectively offset its carbon footprint as the production and usage of biofuels promote sustainability and are not harmful to the environment.

**What do you think is the future of biofuel research and development (R&D) in Singapore?**

Singapore is known to have great foresight in thinking about the next step where one day there will be no more petrol. Coupled with the revolutionary nature of its petrochemical industry's success, as well as possessing the right capabilities to research and mass produce microalgae biofuel, I believe that it will not be a problem for Singapore to delve further into biofuel R&D. I believe that Singapore can lead the way in the production and usage of microalgae biofuels regionally because it is technologically capable and has visionary government and industry leaders.