HOW SkyNRG IS TAKING SUSTAINABLE JET FUEL TO THE NEXT LEVEL

BY MEREL LAROY (SkyNRG)

SkyNRG was founded in 2010 and officially launched after supplying the first commercial biofuel flight, operated by KLM in 2011. SkyNRG was set up to create a market for sustainable jet fuel and has built up a track record in recent years, supplying most of the biofuel flights to date.

The need for aviation to become part of the bio-based economy was evident. Especially as there has been a strong focus in recent decades from governments and industry on the development of a bio-based economy. This trend has emerged for three reasons: the need for carbon emissions reductions, energy security and resource resilience, and economic development and industry innovation.

However, the global nature of the aviation industry makes it difficult to regulate biofuels and carbon emissions as in some other industries. The aviation industry has recognized the need for sustainable biojet fuel as there is no other known practical alternative to liquid energy carriers. Biofuels are the only option to bridge a transition to any (yet unknown) new propulsion technology, which may emerge in the next 30 years.

In the last five years, aviation has emerged as one of the front runners in voluntarily embracing the development of sustainable fuels. After SkyNRG supplied the world's first commercial biofuel flight in 2011, the company received biofuel requests from all over the world and over the following two years the company supplied biofuel to more than 20 customers, including: Finnair, Alaska Airlines, Etihad, Qantas Australia, LAN Chile, and Air Canada. The biofuel flights by those companies demonstrated the feasibility of the product and that biofuel, when produced according to strict standards, is a safe and sustainable aviation fuel. Since then, there has been growing interest from the aviation industry in sustainable jet fuel and a large collective effort is underway to scale production capacity.

However, high price premiums have been the biggest challenge that limited the uptake of sustainable jet fuel to-date. This has partly been caused by an uneven playing field with the mandated road transport biofuels sector (in the EU and USA). The road transport suppliers are under these mandated systems obligated to blend biofuels into the existing fuel system. As the aviation industry is not obligated, existing production capacity allocates its resources towards road transport biofuels, consequently driving up the prices of biojet fuel. Since airlines do not have enough capital to pay the premium for sustainable jet fuel, SkyNRG installed several "smart" co-funding mechanisms to bridge the price gap with fossil fuels. For example, in 2013 SkyNRG started to actively involve other stakeholders such as governments, airports and even an airline' corporate customers; all parties which can also benefit from developing a market for aviation biofuels. By co-funding the premium, these parties help to aggregate demand and enable production capacity in the short term.

A successful example is the **KLM Corporate BioFuel Programme** that was launched in 2012. This programme offers KLM's corporate customers such as ABN AMRO, Nike and Accenture an opportunity to reduce their corporate carbon footprint from business travel by flying (partly) on sustainable biofuel. The programme enabled SkyNRG and KLM to launch the first weekly series of biofuel flights between New York and Amsterdam, demonstrating that biofuel can provide a real sustainable solution for the aviation industry in the long term.

Figure 1. KLM Corporate BioFuel Programme: Biofuel Flights From Amsterdam to Aruba and Bonaire. (Photo credit: KLM)

SkyNRG & Sustainability

From the start, SkyNRG set the bar high when it comes to the sustainability of biojet fuel. SkyNRG has its operations RSB certified and is advised by an independent Sustainability Board in which the World Wide Fund for Nature (WWF-NL), Solidaridad, and The Energy Academy hold a seat. SkyNRG's sustainable jet fuel has the potential to reduce CO_2 emissions by up to 80%, compared with fossil jet fuel.

The KLM Corporate BioFuel Programme

The KLM Corporate BioFuel Programme (CBP) was launched in 2012 with a series of biofuel flights to the RIO+20 United Nations Conference on Sustainable Development. The corporate partners in the programme pay a surcharge that covers the price difference between sustainable jet fuel and fossil jet fuel. With this biofuel, these companies reduce their CO_2 footprint from business travel and at the same time contribute to the further development of this market. So far, the programme has enabled biofuel flights to Rio de Janeiro from Amsterdam Paris, from New York to Amsterdam, from Amsterdam to Aruba and Bonaire, and from Oslo to Amsterdam. Current partners in the programme are ABN AMRO, Accenture, CBRE Global Investors, FMO, FrieslandCampina, City of Amsterdam, Heineken, Loyens & Loeff, Nike, Perfetti van Melle and the Schiphol Group.

The Fly Green Fund

The Fund, a first of its kind in the world, enables organisations and individuals to reduce their carbon footprint, by flying on sustainable jet fuel. Its main focus is to secure the necessary funding to increase the demand for sustainable jet fuel in the Nordics. The Fly Green Fund is different from carbon offsetting schemes run by airlines around the world. Instead of compensating for CO_2 emissions, the Fly Green Fund helps to make the aviation industry itself more sustainable. This industry can only be build when all key stakeholders work together. That's why the Fly Green fund is not just restricted to one airport or airline but welcomes all partners that are committed to make sustainable jet fuel a reality in Sweden.

In 2015 SkyNRG launched a similar corporate program in The Nordics, called the **Fly Green Fund**. The fund was co-founded by NISA and Karlstad Airport, with Partners from the aviation industry such as Swedavia, SAS, KLM, Braathens, and European Flights Services. The fact that the Nordic countries are booming in the field of sustainable jet fuel was also proven by the recent **Launch at Oslo Gardermoen Airport**. In January 2016, this airport was the first in the world to make sustainable jet fuel available for all airlines refuelling from the airport's main fuel farm, via the existing hydrant system. This was partly made possible by Avinor, the Norwegian airport operator that has taken a very proactive role in phasing in jet biofuel for aviation, making Oslo Airport available for the project and covering a significant share of the premium cost of the sustainable jet fuel.

Figure 2. Fueling With Biofuel at Oslo Gardermoen Airport. (Courtesy Avinor).

Another initiative is a business model that engages airports as key stakeholders in growing the market for sustainable jet fuel. For this initiative, SkyNRG is partnering with Carbon War Room, a non-profit entity that accelerates the adoption of business solutions that reduce carbon emissions and advance the low-carbon economy (see article page 159). Currently, SkyNRG is also working on an end-customer proposition, offering individual travellers the opportunity to buy their personal 'biofuel-ticket' and contribute to sustainable flying.

In parallel with these co-funding programmes, SkyNRG is setting up regional supply chain "BioPorts" for sustainable jet fuel. The company is teaming up with airlines and airports around the world to create the structure and the market pull that will enable regional sustainable jet fuel supply chains to get financed and built. The BioPort model is based on a regional approach which means that the benefits can go well beyond carbon reduction. SkyNRG sees energy security, reduced price volatility, (potential) development of local communities and rural areas, adding value to (marginal) lands and economic growth, as main drivers to engage a broader group of stakeholders (e.g. governments, farmers, investors, NGOs). For a Bioport, SkyNRG uses the feedstock that makes most sense for the subject region and engages the right conversion technology.

SkyNRG already launched several BioPorts including: BioPort Karlstad, BioPort Brisbane, and BioPort Holland. Apart from SkyNRG being a Dutch company, an important reason why a BioPort is being developed in the Netherlands, is the incentive structure, offered by the government. Since 2013 the Dutch government has allowed biojet fuel to voluntarily opt-in under the European Renewable Energy Directive (RED) mandate for road transport fuel. This opt-in allows biojet fuel suppliers to generate biofuel certificate, which can be sold to the obligated party in the road transport sector. Therewith, biojet fuel counts towards the member states' 10% Renewable Energy Share target and at the same time this mechanism helps to bridge the price gap between fossil and bio jet fuel. SkyNRG is currently actively encouraging other EU Member States to follow this example as the company considers this a very important tool to accelerate the development of sustainable aviation biofuels in Europe.

BioPort Holland

BioPort Holland is an initiative focused on creating a local supply for sustainable bio jet fuel in the Netherlands. The stakeholders aim to create a structural bio jet fuel supply and demand hub for Western Europe. Current partners are: KLM, Schiphol Airport, SkyNRG, Port of Rotterdam, Neste, the Ministry of Economic Affairs (EZ), and the Ministry of Infrastructure and Environment (I&M).

In the short term (2014-2018), the partners focus on getting a bio jet fuel supply chain up and running tosupply significant quantities of sustainable bio jet fuel to Schiphol Airport. Key efforts for 2016 are: setting up the physical supply chain, ensuring sufficient volumes of truly sustainable feedstock, developing financial mechanisms to overcome the initial premium price, and assisting with project development financing.

With its BioPort model, SkyNRG is bringing together technology players, governments, airlines, airports and NGOs all over the world to further develop the market for sustainable jet fuel. In Europe, these activities are brought together under the RenJet project; a collaboration involving industry, entrepreneurs, and knowledge institutes that jointly aim to lay the basis for regional bio jet fuel supply chains in Europe. RenJet is facilitated, driven, and sponsored by Climate KIC and is regarded as one of the highest impact projects on sustainable jet fuel in the European Union.

Project Solaris (Photo Credit:Sunchem)

Biofuel at Oslo Gardermoen Airport

From January 2016, all airlines refueling at Oslo Airport can have sustainable jet fuel delivered from the airport's main fuel farm, via the existing hydrant system. The fuel was made available by SkyNRG, Air BP and Avinor, the Norwegian airport operator. Avinor played a key role in the commercial offtake agreements by the early commitment to the project and by paying a significant share of the premium cost of the sustainable jet fuel for all flights at Oslo Airport that are powered sustainable jet fuel. The sustainable jet fuel is produced by Neste in the framework of the demonstration project ITAKA, funded by the European Union's Seventh Framework Programme. ITAKA (Initiative Towards sustaAinable Kerosene for Aviation) is the first project worldwide that demonstrates the entire value chain for biojet production and the first supported by the EU of this scope. This project has received funding from the European Union's Seventh Framework Programme for research technological development and demonstration under grant agreement No 308807. In addition to using biofuel from the hydrant system, some of the biofuel for KLM will be delivered by refueling trucks. In cooperation with Embraer, biofuel efficiency will be assessed in comparison with fossil kerosene.

Project Solaris

Sunchem SA and SkyNRG have teamed up to scale the energy rich tobacco crop "Solaris" in South Africa, supported by South African Airways and Boeing. Solaris is a nicotine-free and GMO-free crop variety that yields significant amounts of sustainable oil (as feedstock for bio jet fuel) and high quality animal feed. As of September 2015 the cultivation of Solaris has been certified by the Roundtable on Sustainable Biomaterials (RSB) ensuring compliance with rigorous environmental and social standards. Starting in Limpopo province, the partners are laying the basis for a new regional bio jet fuel supply chain. Through this project they will bring economic and rural development to the region in a sustainable way.

Currently the company is involved in a number of feedstock projects. One of these collaborations is project **Project Solaris**, an effort to develop sustainable jet fuel in South Africa from the nicotine-free tobacco plant variety, called Solaris. The project involves SkyNRG and Sunchem, and is supported by Boeing, South African Airways, and RSB. In Canada, SkyNRG is involved in a project with Boeing, Air Canada, WestJet, Bombardier and

the University of British Columbia to turn forestry-industry waste into sustainable jet fuel.

In the coming years, SkyNRG expects that an important change in supply dynamics will come from the certification of renewable diesel as a blend-stock with fossil jet fuel. The certification of this product as a jet fuel component is expected in the second half of 2016 and will increase the capacity to 3 million tons globally. At the same time, there are a growing number of initiatives that focus on optimizing the supply process of biofuel by moving from delivery by truck to an integrated supply chain, whereby the fuel will be distributed via the hydrant system of the airport. Oslo Airport is a great example of this. These are very important steps to truly integrate sustainable jet fuel into the existing infrastructure, making this fuel just like any other fuel, but with the extra advantage that it is much more sustainable.

The RenJet Project – by Climate KIC

The RENJET project accelerates the development of sustainable Bio Fuel supply chains that may account for up to 20% of jet fuel demand in the European Union in 2025. The project develops knowledge, practices, procedures and tools, tests and pilots them, towards the overall goal of a self-sustaining network of regional renewable jet fuel supply chains throughout Europe and beyond.

The activities range from: selecting and expanding the supply of available feedstock(s), managing stakeholders and conversion steps, support of ASTM certification up to signing offtake agreements for certified Bio Fuel, and defining business models that take all stakeholders into account.