Sundance Renewables – the story behind a 'good' biofuel

Jan Cliff, Founder and Director of Sundance Renewables.

Sundance Renewables was born from a sense of optimism that a sustainable society, reliant on renewable energy technologies and based upon key principles of co-operation, compassion and care for the planet can be created. Sundance Renewables is one of the main NFPs (not for profit organisations) for renewable energy in Wales and is Wales' premier biodiesel manufacturer. It is at the same time a not for profit company limited by guarantee, a community social enterprise and a worker co-operative. Our aim is to help community regeneration through appropriate and sustainable methods and the development of renewable energy projects. Using renewable energy, combined with energy efficiency measures, will help to reduce global warming and pollution that arises from the burning of fossil fuels. Renewable energy has the potential to provide energy security for the future, more local jobs and to retain wealth in the local economy. By acting now to increase the uptake of renewable energy, we have the opportunity to offer a better environment for our children. The challenge is to ensure that no usable oil goes to waste and that community based, not-for-private-profit businesses can thrive in what is an incredibly challenging commercial environment.

Our History

Sundance has pioneered the use of used cooking oil (UCO) as a raw material and supplies the local community with truly ethical and sustainable fuels at a fair price. We began our biofuels project in March 2002 with the commissioning of a comprehensive feasibility study for a community based biodiesel plant operating in the Carmarthenshire area. The study was undertaken as a research thesis for a Masters degree course at the University of Wales, Swansea and showed that through community collection of UCO, the viability of such a plant could be sustained. Encouraged by the study, Sundance obtained a Waste Carriers License and has been offering a free service for the collection of waste oil since October 2002. Following the set up of the first community based biodiesel production plant in the UK in 2004, Sundance Renewables saw a significant increase in demand for biodiesel. As general concern for climate change rose, so did demand for renewable fuels to replace the burning of fossil fuels. Sundance has successfully met this demand through local production, and has established a strong customer base to meet demand for biodiesel as well as our collection service.

Our current aim, with the help of Environment Wales has been to replace our pilot plant facility with a larger plant to enable financial sustainability through developing a network of biodiesel production and supply across Wales. This is far from an easy task. In the last two years, 3 of the 4 operating biodiesel plants in South Wales have closed leaving only Sundance. This contraction offered the opportunity to purchase the assets of BioTech Oil's bio-refinery at Tafarnaubach Industrial Estate, Tredegar, a facility designed to produce 10 million litres/year. In October 2008, Sundance took the bold step of signing the asset purchase agreement with the Administrators of the site and put down a £10,000 non-refundable deposit.

The application was duly made to the Environment Agency for the Environmental Permit transfer which came through at the end of January 2009, at which time the final payment for the asset purchase was also settled. During this year, significant investment has been made by us in the Tredegar plant to restart production. The project still requires significant help from the Assembly Government to be viable, and help a deprived part of Wales move towards more sustainable jobs and local production, in line with the Green Jobs strategy.

Why Biofuel?

The benefits of biofuel from waste cover both energy security and climate change. There are other benefits, well documented, such as improvements in most local emissions and its reduced environmental impacts in case of spillage etc, but these are secondary. Biofuels thus have a unique role to play in European energy policy. Biodiesel today is the only direct substitute for oil in transport that is available on a significant scale; other technologies, such as hydrogen fuel cells may have important roles to play in the future, but are far from large-scale viability, and requiring major changes to vehicle fleets and the fuel distribution system.

Changing the fuel mix in transport is important for *Energy Security* because the European Union's transport system is almost entirely dependent on oil. Most of this oil is imported, much of it from politically unstable parts of the world. Oil is the energy source that represents the most severe security of supply challenge for Europe. EU27 countries are already about 82% dependent on imported oil and with this set to rise to over 90% by 2020.

Biofuels have a second great advantage: the fact that their production and use leads to *Greenhouse Gas (GHG) savings*. They are not the cheapest way to get GHG savings, but they are one of the few measures, alongside improvements in vehicle efficiency, offering the practical prospect of large-scale GHG savings in the transport sector in the medium term. Saving GHG emissions in transport is particularly critical because its annual emissions are expected to grow by 77 million tonnes between 2005 and 2020, three times as much as any other sector. Even by 2010, transport will be the largest single contributor to greenhouse gas emissions globally.

GHG savings from biofuel rely critically upon its method of production. Biofuels absorb Carbon Dioxide (CO_2) during their production and release it when they are burnt in engines, so offering lower CO_2 emissions than conventional petrol or diesel, which do not absorb any CO_2 in its lifecycle. However in the production of oilseeds for biodiesel, primary energy is used and GHG are emitted, particularly from nitrogen fertilisers. The GHG savings from biodiesel thus range from near 100% for local production from waste cooking oil (which does not involve cultivation, extraction and refining of plant matter) to under 40% GHG savings using energy and fertiliser intensive oilseed production pathways. However, even at the lower end of the GHG savings calculations, there is no other fuel currently available that can offer these kinds of savings, and there is unlikely to be in the near future until we see renewable or nuclear generated hydrogen or electricity for road transport.

The transportation sector is responsible for more than 70% of total petroleum consumed and one third of the global CO_2 emissions. In November 2001 in response to the Kyoto Protocol emission reduction goals and to gain energy security for its members, the Commission to the European Parliament issued a directive to promote the use of biofuels with the objective of a 20%

substitution of alternative fuels in the road transport sector by 2020. One of the principal reasons for gaining support from the national governments of the European Union to biodiesel manufacturing is that the use of biodiesel from used cooking oils reduces the net production of GHG[1].

Managing Biofuel Impacts

The broad impacts and benefits of different biofuels need to be better understood and reflected in public policy. The 2007–2008 period saw dramatic world food price rises, bringing a state of global crisis and causing political and economic instability and social unrest in both poor and developed nations. In the media the blame was laid inexorably on biofuels as the main culprit for this price hike; incredibly damaging for the public image of 'good' and 'bad' biofuel alike, especially amongst environmentalists. In fact, current production of biofuels uses about 1% of global land available for agriculture, and biodiesel made from UCO, being a waste product that does not compete with food production, has no case to answer, perhaps unlike biofuel from virgin feedstocks. However the barrage of criticism has seriously corrupted the perception of *all* biodiesel in the market place across the board, irrespective of its raw material source.

There are, of course a multitude of other possible sources for global food price hikes – climate change among them. The increasing affluence of much of Asia (and mainland China) has also brought with it a change in lifestyle and eating habits, particularly a demand for greater variety and more meat in the diet, leading to greater demand for agricultural resources. There is also some suggestion that financial speculation on the commodity markets may have an impact. In response to the effect of this speculation, the head of the UN Environment Program, Achim Steiner is quoted:

> "*We have enough food on this planet today to feed everyone, but the way that markets and supplies are currently being influenced by perceptions of future markets is distorting access to that food. Real people and real lives are being affected by a dimension that is essentially speculative*."

Between 1974-2005 food prices on world markets fell by three-quarters in real terms. Food today is so cheap that the West is battling gluttony even as it scrapes piles of half-eaten leftovers into the bin: depressed world prices created by rich world farm policies over the past few decades have had a devastating effect, dumping subsidized grains at below cost prices into poor countries and hurting the local farming industries. There has been a long-term fall in investment in farming and the things that sustain it, such as irrigation. Poor countries that used to export food now import it. It is because of this shift that the developing countries suffer so badly now with rising food prices, the irony is that they have been low for so long.

The Market for Biofuels

There are, of course good biofuels and bad biofuels. Chopping down the world's remaining virgin forests to provide biofuels for SUVs, devastating habitats, and having dubious effects on tackling climate change, is to be avoided at all costs. It is good that some of these malpractices are being exposed by NGOs and other organisations. However, this must not create an atmosphere of scepticism and disillusionment, discrediting an industry fighting for its very survival against powerful incumbent interests, whereas, for example, insignificant amounts of palm oil have been used in biodiesel production – an estimated 30,000 tons in 2005 – compared to in food with the latter driving global palm oil production to increase by nearly 10 million tons between 2001/02 and 2005/06.

Biodiesel production in Europe is growing exponentially and in the past 15 years there has been a dramatic uptake of biofuels in Europe and USA in particular. The UK has witnessed biodiesel production soar from 19,000 tonnes being sold in 2004 to over 900,000 tonnes in 2008, with the production often being sold years in advance. There are internationally several producers of full scale commercial plants, located in Austria, France, Germany, Spain and USA. Biodiesel competes in the market with petro-diesel as it has proven to be a high grade fuel that can be used for diesel engines without modification. However, Biodiesel is not *cost* competitive with petro-diesel without subsidies or tax incentives. It has however been possible to sell biodiesel above the current price of petro-diesel to environmentally concerned customers – similar to the way organic food has a premium price that many consumers will opt to afford. If biodiesel is priced a few pence per litre below the going price of petro-diesel, all production should be easily sold, given the distribution infrastructure. Since commencement of sales, Sundance has run out of stock on several occasions. Conventional economics would dictate that in this position, we should increase our price. However, it is important to Sundance that we retain our integrity and ethical stance. We sell biodiesel at an "honest price" – one that does not have to hide environmental costs, unlike the petrochemical industry. There are numerous environmental benefits to biodiesel made from recycled vegetable oil, but unfortunately, conventional economics does not reward environmental good practice.

Despite massive success in Europe in the expansion of bio-fuels, biodiesel is a new product for Wales and establishing markets will take time. Currently, there are no affordable turn-key facilities for small scale production of biodiesel and this potentially profitable and sustainable market is consequently under-developed. For this reason, Sundance started with a relatively small processing plant capable of producing 4,000 litres per week. Now we have managed to scale up to a production level of approximately 20,000 litres per week in response to a steadily growing demand, and with a current capacity of double this amount, given the necessary financial support.

The two critical factors affecting the biodiesel market are taxation and the warranty approval for the vehicles. Although a harmonisation throughout Europe would be beneficial to development of the industry both in terms of taxation and warranty approvals, this is currently not the case. Each country has its specific legislation and tax regime for all fuels, including biofuels, and vehicle manufacturers vary their warranty approval between countries.

Germany, has been the leader in the field of biodiesel for over 10 years, with a proactive approach and favourable tax regime. In 2004, an estimated 476 million litres were sold at German filling stations, 32% more than in the previous year. This was enough to satisfy the annual requirement of approximately 300,000 cars. Biodiesel is available at 1,900 filling stations across Germany, which means that it is in some regions no longer an inconvenience to use biodiesel as a pure fuel. Remarkable is the fact that at the end of 2006, with total sales of 3.1 million tons, more than 10% of diesel consumption in Germany was in the form of biodiesel or vegetable oil. Consequently, in terms of the diesel market, by 2006 Germany had already fulfilled the quantitative target set for 2020.

Germany is generally the driver for the rest of Europe in the biodiesel industry and what happens there will have significant impacts on the future of the industry within Europe. However, the flagship of European biodiesel has come upon rough seas. Its continued growth is being hampered principally by the

reversal of the position of car manufacturers such as Volkswagen in their warranty approvals. Volkswagen Group (VW, Audi, SEAT, Skoda) has stopped issuing warranty approval since the introduction of the EURO 4 engines and self-regenerating particle filters. As a result, the potential private car customer base will very likely diminish over the next few years. Declining turnover at the filling stations will lead to a reduction in the number of filling stations: previously a companion of the biofuels industry, the German car manufacturers are now standing in its way.

With the private car fleet increasingly young (and hence in warranty), this issue is critical. It is possible that consumer pressure could persuade manufacturers to a more positive attitude (as might a liability shift to corporate users such as local authorities). Clearly, however, the pool of diesel vehicles already out of warranty will remain important. Favourable warranties are found with Mercedes Benz, aimlerChrysler, MAN and IVECO who have given approvals for EURO- 4 and EURO-5 truck engines in commercial vehicles whereas French manufacturers PSA Peugeot Citroën and Renault approve warranties for their vehicles up to 30% biodiesel under certain conditions.

The Need for Urgent Action in Wales

Wales is seeking to be recognised as a "global showcase for sustainability" and its use of renewable energy will play an important part in this scenario. Indeed, Wales has a special commitment to sustainability built into the Constitution of the Welsh Assembly Government (Section 121) and it is also committed to supporting the development of the social economy, as outlined in its policy and strategy guideline *Learning to Live Differently*. The UK and Wales has signed up to the 2020 EU target of 20% of energy requirements (electricity, heat and vehicle fuels) coming from renewable sources, including those linked to the waste cycle. In November 2005, the UK government announced it would introduce a Renewable Transport Fuel Obligation (RTFO) that requires transport fuel suppliers to ensure a proportion of their sales are from renewable sources. The RTFO was introduced in April 2008 and it is estimated that this policy alone should save 1 million tonnes of carbon at an obligation level of 5%.

Road transport contributes about 20% of the EU27 carbon dioxide emissions, and must play a fundamental role in greenhouse gas emissions reductions if we are to stave off catastrophic impacts on our living planet. Despite the desperate urgency of the situation, alternative fuel producers and environmental technologies are constantly facing resistance, criticism and hostility. If the same strict criteria were applied to the present generation of energy technologies, it would make a mockery of them. Particularly in the last year, biodiesel has faced many harsh and ill-informed attacks. Regrettably, at the same time political support for the *local* production and consumption of biodiesel is completely lacking as the government gives subsidies and tax incentives only to large scale producers and importers of bioblends. The RTFO is wholly biased towards large scale production of biodiesel.

The collapse of the biodiesel industry in the UK is due to a market failure that has been compounded by counterproductive government policies and perverse incentives. In this context, without financial support from the public sector to keep the nascent biodiesel industry alive in Wales it may disappear completely.

The Future for Sundance?

Sundance has many strengths: a committed workforce operating within a robust and empowering cooperative structure first among them; we have a strong track record in proving the fundamentals of the biodiesel market in Wales and have developed good relationships with our customer base, and with public sector organisations including the Environment Agency. Together with our strong environmental quality standards (including a Green Dragon 'excellent' and a similar rating from our Business Sustainability Healthcheck by Synnwyr Busnes - Business Sense at Bangor University), these foundations are building towards our development as a self-sustaining social enterprise. As with any organisation we face growing pains, particularly in accessing finance and ensuring our small worforce has a sustainable workload.

The expansion of our refining capacity at a time when the twin challenges of energy security and climate change appear of overwhelming importance provide great opportunities (as do Government targets for biofuels). Our future plans include the development of the Sundance House EcoCentre at Ammanford, and the provision of a community transport hub in Tredegar. Threats to these plans are many, and include uncertainties arising from current global economic crisis and a lack of confidence in biofuel industry as over-ambitious and speculative private enterprises flee the sector; and allied to this, banks being unwilling to fund biodiesel projects as a result of sector being regarded as too risky. In this challenging world, what we need from the Welsh Assembly and UK Governments is policy and support that is consistent is prioritising genuinely local and low-carbon biofuel supply, rather than more of the international-industrial approaches that have been complicit in causing the problems we currently face. Only then can Sundance hope to be part of the solution: to 'be the change we want to see in the World'.

Note

1 Well to Wheels Assessment of Rapeseed Methyl Ester Biodiesel in the UK. Shell Global.