



LCV2015 Event - Millbrook

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Department
for Transport



Office for
Low Emission
Vehicles



Briefing scope

- Low Carbon Truck Trial - Consortium overview
- Results Highlights
- UCO technology
- Scalability
- Where next?





Consortium Partners

Consortium

- United Biscuits – Consortium Lead
- Convert2Green Ltd – Ultra Biofuel supplier
- University of Leeds – Academic partner; verification and analysis of results





United Biscuits

- Largest Biscuits and Snacks food manufacturer in UK
- United Biscuits Logistics is an in-house function distributing on behalf of UB and Intersnacks throughout the UK and Ireland.
 - **350 articulated loads a day**
- Well developed corporate sustainability programme with targets in all areas
- 'Fewer and Friendlier Miles' transport campaign reducing carbon emissions by 40% since 2006 through a range of initiatives.
 - **re-use of waste oils from manufacturing as a potential diesel alternative**
- Trials commenced using waste oils blended with diesel however results were mixed.
- Breakthrough with Biomotive Fuels now part of **Convert2Green** who had developed an engine conversion enabling conventional vehicle to run on a much higher blend of Biofuel from waste vegetable oil.



Convert2Green / University of Leeds

Convert2Green (an Olleco company)

- C2G founded in 2006
- National used cooking oil collection service
- Leading independent UK biofuel manufacturer
- National delivery of bio diesel, C2G Ultra Biofuel™ and other biofuels
- Large research and development programme
- Supplies over 2,000 vehicles in UK
- Close government advisor on biofuel policy
- Blue Chip customer base



University of Leeds – Energy Institute

- Life Cycle carbon footprint analysis
- Fuel properties and lube oil studies
- Emissions and fuel efficiency studies





Scope of Trial (completed March 2015)

- 12 vehicles on trial running on “C2G Ultra Biofuel”
- 10 x Euro 5 Mercedes Axor 2543LS, 2011
(plus 2 identical Euro 5 vehicles as diesel comparators)
- 2 x Euro 6 Mercedes Actros 2545LS, 2014



- Single refuelling station supplies 100% Ultra biofuel with remote fuel management

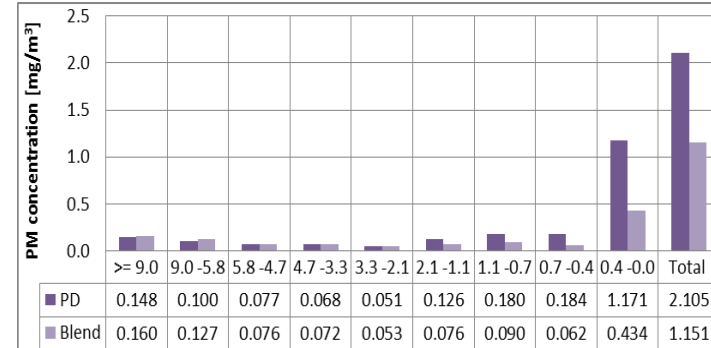


• **UB Trial commenced February 2013, completion report submitted March 2015**



Trial Headlines

- > 3.5 M kms travelled to date using c 929,000 litres UCO
- c 3,000 tonnes **CO2e** saved (i.e. equivalent to taking 1.97 million truck miles off road)
- Fuel substitution average rate **85%** ultra biofuel and **97%** carbon saving
- “Well To Wheel” benefit of **82.5%** carbon saving over fossil diesel
- >40% reduction worst PM over fossil diesel
- No related mechanical issues
- No cold weather issues (all year round performance)
- Fuel consumption performance in line with std diesel (MIRA confirmed)
- No increase in Repair & Maintenance (R&M) spend
- Good driver feedback





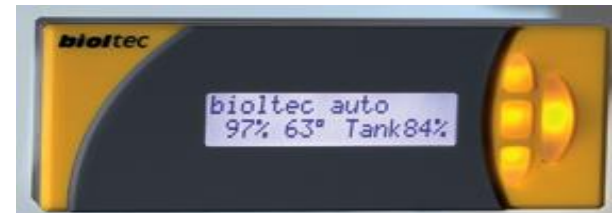
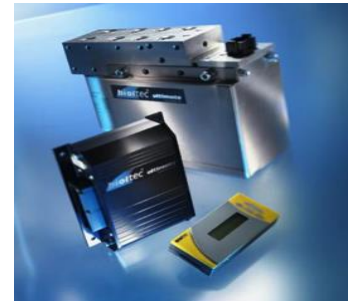
UCO Technology – Fuel

- C2G Ultra Biofuel IS NOT conventional biodiesel. It is not Fatty Acid Methyl Esther (FAME)
- C2G Ultra Biofuel IS a vegetable oil made from Used Cooking Oil
- Manufacturing plant at C2G in Middlewich using bespoke refining and purification technology
- Low impact refining process: enables **Carbon saving over derv 97%**
- Conforms to fuel cleanliness and quality standards
 - German Quality DIN 51 623
 - ISO 4406



UCO Technology – Truck

- Dual fuel system which runs the truck on a mix of white derv and Ultra Biofuel
- Split/dual fuel tank fitted which feed through to 'intelligent mixing system'
- Fuel Management System blends Ultra Biofuel as the engine load and operating temperature increase and vice versa
- **Average Fuel Substitution 85%**
- Dual fuel truck conversion technology supplied by German partners Bioltec GmbH
- Fitted by United Biscuits VMU based in Ashby de la Zouch
- Vehicle Telemetry supplied by ProEmion, Germany





University of Leeds – Study Papers

- Life Cycle CO₂ emissions analysis (LCA)
- Real world Biofuel consumption
- Real world Biofuel Substitution Ratio
- Real world tail pipe emissions
- Injector Study
- SAE papers being published to cover the above
- Papers on this trial presented at 3 conference last year
 - World Congress, Detroit
 - International Powertrain & Fuels conference, Birmingham 2014
 - Green Transport, Renewable Energy & Environment Conference, Tianjin, China



Awards – Achievements 2015

Trial also received industry recognition

- Motor transport Awards 2015 – Shortlisted - Low Carbon Award
- Low CVP: Low Carbon Champions - Shortlisted - Fuel Initiative of the Year **TBA**
- National Transport Awards 2015 – Shortlisted - Freight Operator of the Year **TBA**
- Chartered Institute of Logistics Transport – Finalist – Environmental Improvement **TBA**



Ultra Fuel is Scalable & Available

UK Context:

- Estimated **250,000,000** litres UCO generated in the UK (1bn EU)
 - only half used for Renewable Transport Fuels Obligation (RTFO)
 - are we making the best use of this precious resource ?
 - what about UCO Europe/world wide?
- This approach works equally well with animal fats
- **If this technology was used for 50% of UK waste fats and oils – this approach alone could remove 3% of the total UK CO2 emissions**
- How do LNG/CNG truck efficiencies compare?



Moving Forward

- **As demonstrated by UB over 3 years, C2G Ultra biofuel is the most sustainable and carbon efficient** fuel available for LGV's
- Continue monitoring of 6 x Euro 6 Merc Actros
- Euro 6 conversions thus far self-funded **but seeking financial support to:**
 - measure and understand the benefits with Euro 6
 - 'future proof' fleet as Euro 5 is phased out
 - expand Euro 6 fleet to increase carbon reductions
- RTFO scheme in place but greater financial assistance required



Where do we go from here?

- C2G Ultra Biofuel is the highest possible carbon saving fuel
 - made in the UK from UK waste
 - proven and scalable
 - capable of supplying several hundred million litres to LGV's
 - **The Market is LARGE**
- Real choice for other fleet operators to take up
- Looking to DFT, OLEV to add their support to the development of what could be the most effective low carbon fuel available.....



Winning combination ? – Proving what is possible



- A euro VI tractor unit operating on waste oils - 82.5% CO2 savings
- A 2m longer trailer (operating under a DfT trial) – 15% CO2 saving
- **The combination generating a 95% CO2 saving vs a conventional articulated vehicle**