

Syntech ASB (Advanced Smart Biofuel)

Life Cycle Assessment

Syntech Biofuel

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Goal and Scope Definition:

Goal: To assess the environmental impacts of producing Syntech ASB (Biofuel/Biodiesel) from used cooking oil (UCO)

Scope: Cradle to Grave assessment, including raw material extraction, transportation, production, distribution, use, and end of life.

Raw Material Extraction:

Input: Used Cooking Oil (UCO)

Processes:

- Transportation of UCO to Syntech Biofuel production facility at Kingsnorth, Medway, Kent.

Outputs:

- Energy consumption and emissions associated with collection and transportation
- The overall carbon footprint of our supply chain journey is significantly lower than comparable biofuels and fossil fuels. It's delivery origin is 30m/53km away in Gt Warley, near Brentwood in Essex. Our custody chain originates from there as it is defined as a waste product that was produced for the food industry, so has already had a previous life cycle not connected to our process.
- We source UK derived UCO from a single supplier who is part of a UK based national collection group
- The UCO's are collected from recognisable UK hospitality chains including KFC and the Mitchell and Butler brewery group.
- The UCO's we process are collected from Lincolnshire, Norfolk, Suffolk, Essex, London, Kent and East Sussex
- Therefore, our biofuel has 2 benefits, significant emissions reductions and it is the most sustainably produced fuel in the UK.

Biodiesel Production:

Inputs:

- UCO, methanol, catalysts (potassium hydroxide, KOH), citric acid.

Processes:

- Transesterification of UCO to produce 2 products, biofuel and glycerol
- Purification of biofuel
- Energy consumption during production

Outputs:

- Syntech ASB (Advanced Smart Biofuel)
- Glycerol
- Emissions from production processes

Our production process has been developed over 7 years of constant R&D whilst operating under a 20yr OFGEM accreditation granted to export renewable energy to the National Grid. This means we have to meet their stringent operating criteria to qualify for a double counted Renewable Energy Certificate for each litre of biofuel produced.

We make the energy used to power our sites meaning we are de-centralised from the National Grid for imported power.

The transesterification process of producing biofuel also produces glycerol which is considered an organic material which we on-sell for either animal feed or anaerobic digestion which can then be used for additional electrical generation

The water required for our wash water process is reused via a water treatment plant designed and developed by Syntech. We harvest the rainwater from our roofs blend with our process water and add an organic carbohydrate to leave the ph. value suitable for re-use or safe discharge.

Transportation:

Input:

- Biofuel

Processes:

- Transportation of biofuel to end users

Outputs:

- Energy consumption and emissions associated with transportation

Use:

Input:

- Syntech Advanced Smart Biofuel

Processes:

- Combustion of Syntech ASB in engines

Outputs:

- Energy produced
- Emissions during combustion (CO₂, NO_x, Particulate Matters) in our on-site generators are significantly reduced across the combined greenhouse gases. The combustion of biofuels offer GHG savings of up to 92%
- The use of Syntech ASB in fleets and in NRMM plant and machinery similarly offer GHG savings of up to 92%.
- Syntech are members of the Renewable Fuel Assurance Scheme which accredits us with an overall 94%co₂e saving compared to fossil fuels.

End of Life:

Inputs:

- Containers
- Disposal of non-recyclable materials

Outputs:

- None, all delivery vessels are re-useable

Impact Assessment:

To evaluate the environmental impacts of each life cycle stage, including but not limited to:

- Global warming potential
- Acidification potential
- Eutrophication potential
- Human toxicity
- Ecotoxicity

The low hazard organic characteristics of Syntech ASB mean it is fully biodegradable and as such has low impact on any of these environmental outcomes.

Syntech ASB and biofuels from UCO waste streams are considered to be a carbon neutral product in that the CO₂ absorbed and managed during the photosynthesis of the plant negates any negative impact in the production and use as a combustible fuel.

Interpretation:

- Emissions reductions mean it has beneficial impacts on global warming
- Low hazard almost neutral product

Recommendations:

- We are in conversation with the Feedstock suppliers to provide Syntech ASB for their vehicles reducing emissions on their collection rounds.
- We will fuel logistics lorries delivering our biofuel with our biofuel wherever reasonably practical.

Limitations:

- Syntech ASB is a relatively new product pioneered with innovative process and production design and extensive R&D at our HQ in Kingsnorth, Kent. There are accepted challenges and scrutinization involved with construction and infrastructure sector adoption.
- Although operational precedents have been set with HVO plant owners and operators will need OEM approvals to safeguard warranties etc...
- Stage 4, 5 and 6 plant and machinery or any that have been retrofitted will have after treatment systems in place to reduce emissions. This means that our emissions testing equipment will not register a reduction between fossil fuel and Syntech ASB

Conclusion:

It is important to recognise this is a simplified example, and a comprehensive LCA would require specific data inputs.