


## Biofuel 2G

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### **INFORMATION ON THE ECO-INNOVATIVE SOLUTION PROVIDER**

This eco-innovative solution is the output of the project titled “Biofuels 2G” co-funded by the European Commission within the framework of the LIFE Program. This solution has been developed by a team coordinated by the Centre of Research & Technology Hellas (CERTH) in partnership with Aristotle University of Thessaloniki, the Municipality of Thessaloniki and the Association of Restaurants Owners of Thessaloniki. The project was finalized in 2012.

### **SHORT DESCRIPTION OF THE ECO-INNOVATIVE SOLUTION**

Biofuels-2G offers knowhow and a pilot plant for the production of 2nd generation biofuels from waste cooking oil which can be used as biodiesel for diesel trucks and private vehicles. Biofuels-2G is a cost-effective technology for converting waste cooking oil (WCO) into a high quality renewable diesel. The new technology provides a direct valorisation solution for municipal waste. The technology renders over 90% conversion yield by employing catalytic hydro treatment and renewable-based H<sub>2</sub>, providing a high-quality bio-based diesel that can be blended up to 10% with fossil-based diesel. The technology can be adapted for integrating WCO into conventional refineries rendering hybrid fuels so that limited investment is needed.

### **INDUSTRIAL SECTOR – MARKET SEGMENT AND ACTUAL APPLICATION IN INDUSTRY**

29 Petroleum refining and related industries

### **INDUSTRIAL CLASSIFICATION - NACE CODE;**

38 Waste collection, treatment and disposal activities; material recovery

## 1. DESCRIPTION OF ECO-INNOVATIVE SOLUTION

### Technical aspects of the eco-innovative solution

The core element of this new technology is a bio refinery, which effectively converts 100% residual feedstock (waste cooking oil) into high paraffinic bio-diesel. The technology is superior to the conventional FAME biodiesel technology which cannot absorb more than 30% waste lipids. Moreover, the proposed single-conversion step process is more cost effective in comparison with the other existing vegetable oil (HVOs) plants needing a 2-step process. The conversion of WCO into biodiesel involves the process of catalytic hydro treatment. The project owner offers the design of the process and can deliver a pilot plant (control system and hardware). At an industrial scale, the plant needs to be designed by a plant engineering and construction company.

Operating conditions are on the scale of hydro processing units, which are pre-defined. The hydro treatment capacity of an existing refinery could be used to implement this technology meaning it is not necessary to build this plant from scratch.

The resulting fuel will be blended with commercial fossil diesel in a ratio of 1:9. However, the use of the biofuel in a conventional garbage truck was demonstrated and verified in a 1:1 ratio. Testing and product standard compliance are in place.

### Economic and environmental benefits of the eco-innovative solution

The design and commissioning costs of a state of the art refinery are valued at around a 100€ Mio investment for 50-100,000t of biodiesel per year; The solution provided by Biofuels-2G that can be integrated into an existing refinery, only requires a storage tank. Economic benefits range from 5-10% for refining units in comparison to a conventional biodiesel plant.

The proposed technology utilizes a bio-based waste feedstock with collection costs in Europe estimated between 200-600 €/t, providing a cost advantage over raw vegetable oils collection prices that cost more than 800 €/t. Moreover, WCO valorisation for renewable diesel via underlying

refineries has a favourable OPEX and a minimum CAPEX requirement, making the direct infusion of WCO in conventional refineries economically attractive. The renewable diesel has significantly better fuel quality characteristics compared to other biodiesels, in terms of energy density, oxidation stability and combustion characteristics. Finally, the estimated carbon foot print of the renewable diesel has 11-15% less CO<sub>2</sub>-eq as compared with conventional diesel.

## 2. AVAILABILITY OF THE ECO-INNOVATIVE SOLUTION AND BUSINESS PARTNERSHIP

### Market readiness, Trade mark, existing market coverage, commercialization strategy

The solution is ready for the market, a pilot plant was operated in Greece for several years and the use of bio-diesel in conventional cars was verified; Bio-diesel fulfils all relevant technical requirements.

### Requirements to adapt the solution to the local market and potential applications/market size

The establishment of a waste cooking oil collection network is essential.

Bio-diesel will be blended with fossil diesel. Waste cooking oil is highly available in the Mediterranean area.

### On-site after-sales services support and the technical assistance requirements

On-site service provided from Greece

### Targeted local business partners

Existing bio-diesel producers or oil refineries

### Type of local business partnership sought

Open for different kind of cooperation, in particular joint venture, licensing