PROJECT DESCRIPTION:

BACKGROUND

Substituting biofuels for fossil fuels has the potential to reduce greenhouse gas emissions. However, the amount of carbon dioxide generated in the production of the biofuel should not cancel out any relative savings that might result from its use. Second generation biofuels are seen as a solution in this respect, because they are produced from waste products generated from other processes. Under EC proposals, a 5% cap must be imposed on biofuels produced from energy crops. Therefore, the use of residual feedstocks such as Waste Cooking Oils (WCO) is desirable as an alternative to energy crops, and also as a potential solution towards reaching the 2020 goal of the Renewable Energy Directive (2009/28/EC) for 10% biofuel usage in the transportation sector. Furthermore, channelling WCO into biofuels production also reduces their disposal in sewer systems, where they are contaminants that are costly to remove from wastewater.

OBJECTIVES

The main aim of the BIOFUELS-2G project was to demonstrate an innovative and cost-effective methodology for producing second-generation biofuels using recycled WCO as the main

feedstock. The project was targeted towards reducing carbon dioxide emissions, thus towards stabilizing the primary cause of climate change, and promoting the recycling of cooking oil from restaurants and residences instead of disposing them via the sewerage system.

Project objectives involved the study, development and implementation at pilot level of an advanced second-generation biofuels production system, driven by local and regional public-private partnerships. CERTH worked alongside a research group at the University of Thessaloniki, the Municipality of Thessaloniki, and the Association of Restaurant Owners of Thessaloniki; the letter mobilised local enterprises to provide the raw material for the fuel production. Specific project objectives were to contribute to the widespread use of new technologies, knowledge and good practices; to develop a sustainable structure for the production of biofuels; to stimulate long-term collaboration between local stakeholders in the field of waste management for biofuels production; to improve the environmental performance of local authorities and enterprises; and to contribute to the formation of new regional policies and strategies on waste management and sustainability.

RESULTS

The Biofuels-2G LIFE project developed a network for the collection of Waste Cooking Oils (WCO) organised by the Municipality of Thessaloniki and the Association of Restaurant Owners of Thessaloniki, which participated with 23 restaurants.

Innovative technology was developed and used to produce second-generation biofuel from used vegetable oil. This involved the catalytic hydro-treatment of WCO using renewable solar hydrogen energy produced from photovoltaic cells and electrolysers. This ensured a sustainable and economically-feasible biofuel production pathway. The project produced a high-quality second generation biodiesel product, which was tested for the first time in a municipal waste collection vehicle in Thessaloniki. This trial demonstrated both the benefits of using biofuel for transportation and of recycling used cooking oil. Around 2 110 litres of biodiesel-2G were obtained from the processing of 243 m3 per month of solar hydrogen. The overall process yield

was 92% v/v or 920 litres of biodiesel-2G from 1 000 litres of WCO. The biodiesel-2G can be easily used in conventional diesel engines, and reduced fuel consumption rates were recorded. The production process reduced carbon dioxide emissions by 74% compared to production of fossil fuel diesel, with a potential additional reduction of 24.43% through the utilisation of renewable solar hydrogen energy. The total production and consumption of the biodiesel-2G was calculated to reduce carbon dioxide emissions by 11.44% and an additional 3.54% if solar hydrogen is also utilised for its production, representing an overall reduction of carbon dioxide emissions compared to fossil fuel diesel in the order of 15%.

Other environmental benefits include the reduction in the disposal of WCO in sewer systems, which potentially contaminates 1 million litres of water per litre of WCO. From an economic point of view, the hydro treatment method which was used can be applied within an existing refinery since it is a commonly used process. Thus the use of WCO as a feedstock can be integrated into the existing energy sector without high investment costs for new infrastructure. Furthermore, there could be potential for job creation for SMEs needed to collect and transport WCO to refineries or other suitable facilities for conversion to biodiesel.

Further information on the project can be found in the project's layman report and After-LIFE Communication Plan (see "Read more" section).

Visit project site: http://biofuels2g.gr/

Visite EU site: http://ec.europa.eu/environment/life/news/newsarchive2014/june/index.htm#best