

Project Summary

Project description:

West Biofuels—in partnership with the National Renewable Energy Laboratory (NREL) and the University of California San Diego (UCSD)—seeks support for a pre-commercial demonstration of a fungible low carbon fuels synthesis process that results in the development of bio-oil as an intermediate fuel with wide-scale adoption potential for renewable diesel fuel production. The proposed project will support California's transportation sector and greenhouse gas emission reduction efforts.

The Project Team recommends pre-commercial demonstration of an innovative process that builds on significant lab-scale work of validating system and material performance. The pre-commercial demonstration will contain the following three major process steps:

- Catalytic fast pyrolysis (CFP) of biomass to make an upgraded bio-oil with intermediate oxygen content
- Co-processing of CFP oil in a conventional fluid catalytic cracker (FCC) with petroleum-derived vacuum gas oil (VGO) to produce jet and diesel fuel precursors with significant biogenic carbon content
- Upgrading of FCC fractions to diesel fuel by hydrotreating combined with hydrodeoxygenation/hydroisomerization to produce diesel fuel blendstocks.

Project goals and objectives:

This project will demonstrate production of a diesel fuel blendstock precursor from biomass by co-processing upgraded bio-oil in a conventional refinery unit operation, the fluidized catalytic cracker. The use of a bio-oil as a feedstock and/or blendstock in a standard petroleum refinery, either replacing or supplementing fossil-derived materials with biomass-derived materials is a very attractive option. This production pathway would economically advantage the biofuels industry by leveraging the multi-trillion dollar refining and product distribution infrastructure already in place for fossil-derived fuels. Specific goals of the project include:

- Goal 1: Demonstrate production of diesel fuel blendstock precursor from biomass feedstock
- Goal 2: Facilitate the introduction of renewable carbon into existing fuels infrastructure
- Goal 3: Reduce the carbon footprint of a refinery and fuels it produces

To meet these goals, the Project Team has developed quantifiable and measurable objectives that will accelerate the technology into the marketplace:

- Objective 1: Mass conversion efficiency of at least 30% bio-oil with forest wood feedstock
- Objective 2: Mass conversion efficiency of at least 30% bio-oil with almond shell feedstock
- Objective 3: Yield of co-processing distillate products equivalent to yields obtained when processing fossil feedstock only
- Objective 4: Hydrotreating of co-processing distillates to at least 50% material boiling in the diesel fuel range
- Objective 5: A carbon intensity less than 20 gCO₂e/MJ
- Objective 6: Demonstrate a process that will produce an intermediate bio-oil for less than \$3.00 per gasoline-gallon equivalent at a commercial scale