

Universal Biofuels Private, Ltd

CA-GREET Model Inputs and Changes

In addition to the changes to CA-GREET 1.8b models that are tabulated below, the models were also modified to address public comments submitted regarding Universal Biofuels' pathways in the following ways:

Tallow to Biodiesel Pathway (BIOD039) and Used Cooking Oil (UCO) to Biodiesel Pathway (BIOD040):

1. The natural gas for stationary thermal use in India was modeled as being sourced from 30% liquefied natural gas (LNG), which is the amount of LNG imported to India.
2. The natural gas for electricity generation in India was modeled as being sourced from 10% LNG of the total natural gas used for electricity generation.
3. The imported LNG ocean tanker transport distance was modified to 1,332 miles.
4. The imported LNG was modeled as being converted to a gas and then compressed to CNG.
5. The electricity transmission and distribution loss was modeled as 15.27%, which is specific to Andhra Pradesh, India.

The applicant has conducted its analysis of direct effects on carbon intensity for the pathways using CA-GREET, v.1.8b (Dec. 2009) (See http://www.arb.ca.gov/fuels/lcfs/ca_greet1.8b_dec09.xls). The standard inputs and parameters specified in CA-GREET remain unchanged except as noted in the input tables below. The input tables below specify the spreadsheet location of the CA-GREET inputs and other parameters that were claimed as confidential business information or trade secret by the applicant, but it does not disclose the actual value of such inputs and parameters because they are claimed to be confidential business information or trade secret.

Universal Biofuels' input data tables (Locations of cells containing Confidential Business Information are shown, but the actual values of such confidential information are not

disclosed) The first table below is for changes/inputs to GREET regarding the tallow to biodiesel pathway and the second table is for the UCO to biodiesel pathway.

Table 1: Tallow to BD Pathway, Pathway Code BIOD039, Pages 1-2

Pathway Code: BIOD039 Parameter	Cell location	Default BIOD008value	Universal Tallow value	Units
Region for analysis	Regional LT!C2	US Average	India	
Res. oil electric generation	Regional LT!J83	2.7%	0.2%	%
Natural gas electric generation	Regional LT!J84	18.9%	42.9%	%
Coal electric generation	Regional LT!J85	50.7%	50.0%	%
Nuclear electric generation	Regional LT!J86	18.7%	0.0%	%
Biomass electric generation	Regional LT!J87	1.3%	0.0%	%
Other (renewables) electric generation	Regional LT!J88	7.7%	6.9%	%
Glycerin coproduct yield	Tallow RD!C39	0.213	CBI	lb/lb BD
Diesel commercial boiler	Tallow RD!C150	0	CBI	%
Biomass used for biodiesel transesterification	Tallow RD!D188	0	CBI	lb rice husks/lb BD
Diesel fuel for biodiesel transesterification	Tallow RD!D185	0	CBI	btu/lb BD
Electricity for biodiesel transesterification	Tallow RD!D190	47	CBI	btu/lb BD
Energy consumed for rice husks production	EtOH!BP144	612,700	0	btu/ton
Transport distance for purchased rice husks	T&D!FZ93	75	CBI	miles
Fuel Transported for BD plant use	T&D!AD4	Forest Residue	Rice Husks	
Payload of Truck	T&D!AD7	17	CBI	
Biodiesel Ocean tanker transport distance	T&D!GB93	NA	CBI	miles
Biodiesel truck transport distance	T&D!GC93	50	CBI	miles
Biodiesel pipeline transport distance	T&D!GE93	400	CBI	miles
Biodiesel ocean tanker payload	T&D!V5	--	CBI	tons
Biodiesel ocean tanker horsepower requirement	T&D!T12	--	CBI	hp
Ocean tanker fraction diesel power	T&D!GB95	--	CBI	%
Ocean tanker fraction residual oil power	T&D!GB96	--	CBI	%
Ocean tanker outbound energy	T&D!GB108	--		btu/ton-mile

Pathway Code: BIOD039 Parameter	Cell location	Default BIOD008value	Universal Tallow value	Units
intensity			CBI	
Fraction of biodiesel transported by ocean tanker	T&D!CL138	0	CBI	%
Fraction of biodiesel transported by truck	T&D!CL142	80	CBI	%
Fraction of biodiesel transported by pipeline	T&D!CL140	0	CBI	%
Tallow transport distance truck	T&D!IF93	10	CBI	miles
Tallow transport distance rail	T&D!IG93	1400	0	miles
Combustion process	Tallow RD!A158	Coal industrial boiler	Biomass industrial boiler	
Share of combustion process type	Tallow RD!C158	0	CBI	%
Solid fuel type	Fuel_Specs!A57	Corn stover	Rice Husks	
LHV	Fuel_Specs!B57	14,075,990	CBI	btu/ton
NG used for tallow rendering	Tallow RD!B187	4,956	5,355	btu/lb tallow
Tallow used for tallow rendering	Tallow RD!B198	399	0	btu/lb tallow

Table 2: UCO to BD, Pathway Code BIOD040, Pages 3-4

Pathway Code: BIOD040 Parameter	Cell location	Default BIOD002 value	Universal UCO value	Units
Select Region for Analysis	Regional LT!C2	Midwest	India	
<i>Fuel phase electric generation mix</i>				
Res. oil electric generation	Regional LT!J83	2.7%	0.2%	%
Natural gas electric generation	Regional LT!J84	18.9%	42.9%	%
Coal electric generation	Regional LT!J85	50.7%	50.0%	%
Nuclear electric generation	Regional LT!J86	18.7%	0.0%	%
Biomass electric generation	Regional LT!J87	1.3%	0.0%	%
Other (renewables) electric generation	Regional LT!J88	7.7%	6.9%	%
<i>Feedstock phase electric generation mix</i>				
Res. oil electric generation	Regional LT!J83	2.7%	5%	%
Natural gas electric generation	Regional LT!J84	18.9%	15%	%
Coal electric generation	Regional LT!J85	50.7%	80%	%
Nuclear electric generation	Regional LT!J86	18.7%	0.0%	%
Biomass electric generation	Regional LT!J87	1.3%	0.0%	%

Pathway Code: BIOD040 Parameter	Cell location	Default BIOD002 value	Universal UCO value	Units
Other (renewables) electric generation	Regional LT!J88	7.7%	0%	%
Diesel fuel for UCO transesterification	UCO BD!F187	0	CBI	btu/lb BD
Glycerin coproduct yield	UCO BD!C41	0.105	CBI	lb/lb BD
Diesel commercial boiler	UCO BD!D152	0	CBI	%
Electricity for UCO transesterification	UCO BD!F192	47	CBI	btu/lb BD
Biomass used for biodiesel transesterification	UCO BD!F190	0	CBI	lb rice husks/lb BD
Energy consumed for rice husks production	EtOH!BP144	612,700	0	btu/ton
Transport distance for purchased rice husks	T&D!FZ93	75	CBI	miles
Fuel Transported for BD plant use	T&D!AD4	Forest Residue	Rice Husks	
Payload of Truck	T&D!AD7	17	CBI	
Biodiesel Ocean tanker transport distance	T&D!GB93	NA	CBI	miles
Biodiesel truck transport distance	T&D!GC93	50	CBI	miles
Biodiesel pipeline transport distance	T&D!GE93	400	CBI	miles
Biodiesel ocean tanker payload	T&D!V5	--	CBI	tons
Biodiesel ocean tanker horsepower requirement	T&D!T12	--	CBI	hp
Ocean tanker fraction residual oil power	T&D!GB96	--	CBI	%
Ocean tanker outbound energy intensity	T&D!GB108	--	CBI	btu/ton-mile
Fraction of biodiesel transported by ocean tanker	T&D!CL138	0	CBI	%
Fraction of biodiesel transported by truck	T&D!CL142	80	CBI	%
Fraction of biodiesel transported by pipeline	T&D!CL140	0	CBI	%
UCO transport distance by ocean tanker	T&D!IJ93	--	11,500	miles
Combustion process	UCO BD!A160	Coal industrial boiler	Biomass industrial boiler	
Solid fuel type	Fuel_Specs!A57	Corn stover	Rice husks	
LHV	Fuel_Specs!B57	14,075,990	CBI	btu/ton
UCO transport distance by truck	T&D!II93	50	110	miles

Pathway Code: BIOD040 Parameter	Cell location	Default BIOD002 value	Universal UCO value	Units
Share of residual oil for ocean tanker	T&D!IJ96	--	100%	%
Ocean tanker energy intensity				
Ocean tanker back-haul energy intensity	T&D!IJ109	--	CBI	
Share of UCO ocean tanker transport	T&D!DP138	--	CBI	