

# Western Plains Energy, LLC CA-GREET Model

The applicant has conducted its analysis of direct effects on carbon intensity for this pathway using CA-GREET, v.1.8b (Dec. 2009). (See [http://www.arb.ca.gov/fuels/lcfs/ca\\_greet1.8b\\_dec09.xls](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 table below. The input table below specifies 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.

Western Plains Energy (WPE) Input data table (Locations of cells containing Confidential Business Information are shown, but the actual values of such confidential information are not disclosed):

### Biorefinery Operations Input Modifications

<i>Modified Parameter</i>	<i>CA-GREET Cell Reference (Corn or Sorghum model)</i>	<i>2010/2011 Average Western Plains Energy, LLC – Oakley, Kansas</i>	<i>Midwest Sorghum; Dry Mill; Dry DGS, NG</i>	<i>Midwest, Dry Mill, Dry DGS, NG</i>
Yield (gallon/bushel)	Fuel_Prod_TS!D277		2.72	2.72
Total Plant Energy Use (Btu/gallon)	Inputs!C253 or Inputs!E253		36,000	36,000
Thermal Energy Use (Btu/gallon)	Inputs!C254 or Inputs!E254		32,330	32,330
Natural Gas Use (% fuels, Btu/gallon)	Inputs!C255 or Inputs!E255		92.7% * 36,000 = 33,372	92.7% * 36,000 = 33,372
DDG production rate (bone dry lb/gallon)	EtOH!C101 or EtOH!AF101		5.34	5.34
Grid Electricity Use (kWh/gallon)	Inputs!C258 or Inputs!E258		(100% - 92.7%) * 36,000 = 2,628	(100% - 92.7%) * 36,000 = 2,628

### Comprehensive list of modifications needed

Modified Cell in CA-GREET (corn or sorghum)	New Value or Cell Reference	Comments
Inputs!C253 or Inputs!E253	=WPE_Inputs!B24	B24, F24, or J24 depending on the DDG scenario evaluated
Inputs!C254 or Inputs!E254	=WPE_Inputs!B25	B25, F25, or J25 depending on the DDG scenario evaluated
Inputs!C255 or Inputs!E255	=WPE_Inputs!E22	E22, I22, or M22 depending on the DDG scenario evaluated
Inputs!C258 or Inputs!E258	Added formula = (C253-C254)/3412	To compute electric input

EtOHIC101 or EtOHIAF101		See reference calculations
Fuel_Prod_TSID277		See reference calculations
NGIAA66		Remove energy use for gas compression
NGIFO66		Digester efficiency
NGIFO75		Share of digester plant energy input at natural gas
NGIFO76		Share of digester plant energy input as biogas
NGIFO79		Share of digester plant energy input as electricity
NGIFO88		Calculated biogas energy use for digester
NGIFP88	Modified formula	Include biogas use by digester plant in biogenic storage calculation
EtOHIDH172:DH180	Modified formulas	Delete calculations for emissions from solid biomass combustion
EtOHIL178 or EtOHIDH178	Modified formula	Added biogas CH4 combustion emission factor L164*(EFIC12+NGIH135*NGI\$123+NGI1135)/1000000
EtOHIL180 or EtOHIDH180	Modified formula	Added biogas CO2 combustion emission factor L164*(EFIC14+(NGIH137*NGI\$123+NGI1137))/1000000

#### Modification Made to Sorghum Farming Practices

Parameter	GREET Cell Reference	Default Value (g/bu)	Updated Value (g/bu)
Lime application in sorghum farming	Fuel_Prod_TSIDS257	357.6	0