

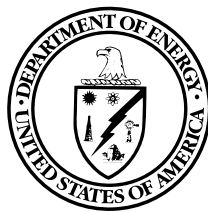
# Draft Environmental Impact Statement

for the

Proposed Abengoa Biorefinery Project  
near Hugoton, Stevens County, Kansas



## Volume 2 - Appendices



U.S. Department of Energy  
Golden Field Office  
Office of Energy Efficiency and Renewable Energy

DOE/EIS-0407D

September 2009

Cover photos courtesy of (left to right):

Southeast Renewable Fuels, LLC  
DOE National Renewable Energy Laboratory  
Public domain

# Draft Environmental Impact Statement

for the

Proposed Abengoa Biorefinery Project  
near Hugoton, Stevens County, Kansas



## Volume 2 - Appendices



U.S. Department of Energy  
Golden Field Office  
Office of Energy Efficiency and Renewable Energy

DOE/EIS-0407D

September 2009

---

## COVER SHEET

**RESPONSIBLE AGENCY:** U.S. Department of Energy (DOE)

**COOPERATING AGENCY:** The U.S. Department of Agriculture-Rural Development is a cooperating agency in the preparation of the Abengoa Biorefinery Project EIS.

**TITLE:** *Draft Environmental Impact Statement for the Abengoa Biorefinery Project near Hugoton, Stevens County, Kansas* (DOE/EIS-0407D) (Abengoa Biorefinery Project EIS).

### CONTACTS:

For more information about this document, write or call:

Office of Energy Efficiency and Renewable Energy  
U.S. Department of Energy  
Golden Field Office  
1617 Cole Blvd.  
Golden, CO 80401  
ATTN: Ms. Kristin Kerwin  
Telephone: (303) 275-4968  
Fax: (303) 275-4790

For general information on the DOE National Environmental Policy Act (NEPA) process, write or call:

Carol M. Borgstrom, Director  
Office of NEPA Policy and Compliance (GC-20)  
U.S. Department of Energy  
1000 Independence Avenue, S.W.  
Washington, DC 20585  
Telephone: (202) 586-4600  
Or leave a message: (800) 472-2756

Information about this document is available on the Internet at the Abengoa Biorefinery Project Web site at <http://www.biorefineryprojecteis-abengoa.com/> and on the DOE NEPA Web site at <http://www.gc.energy.gov/NEPA>.

**ABSTRACT:** DOE's Proposed Action is to provide federal funding to Abengoa Bioenergy Biomass of Kansas, LLC (Abengoa Bioenergy) to support the design, construction, and startup of a commercial-scale integrated biorefinery to be located near the city of Hugoton, Stevens County, Kansas. If DOE decides to provide federal funding, it would negotiate an agreement with Abengoa Bioenergy to provide approximately \$85 million of the total anticipated cost of approximately \$300 million (2008 dollars). The biorefinery would use lignocellulosic biomass (corn stover, wheat straw) as feedstock to produce ethanol and biopower (electricity) sufficient to meet the needs of the biorefinery and produce excess electricity for sale to the regional power grid. DOE also evaluates an Action Alternative, under which the biorefinery would not produce excess electricity for sale to the regional grid, and a No-Action Alternative, under which the biorefinery would not be constructed. The draft Abengoa Biorefinery Project EIS evaluates the potential direct, indirect, and cumulative environmental impacts from the construction, operation, and decommissioning of the biorefinery.

**PUBLIC COMMENTS:** A 45-day public comment period on the draft Abengoa Biorefinery Project EIS begins with publication of the U.S. Environmental Protection Agency Notice of Availability in the *Federal Register*. DOE will consider all public comments postmarked or received during the public comment period. DOE will consider comments received after the 45-day period to the extent practicable. DOE will hold a public hearing to receive oral and written comments on the Draft EIS in Hugoton, Kansas at the date, time, and location announced in local media and in DOE's Notice of Availability published in the *Federal Register*. Written comments also may be submitted by mail to DOE at the above address in Golden, Colorado; via the Internet, [kristin.kerwin@go.doe.gov](mailto:kristin.kerwin@go.doe.gov); or by facsimile (303) 275-4790.

## CONTENTS – VOLUME 2

### APPENDIX A – FACILITIES AND PROCESSES

### APPENDIX B – WETLAND ASSESSMENT REPORT: PROPOSED ABENGOA ETHANOL PLANT HUGOTON, KANSAS

### APPENDIX C – WATER RESOURCES STUDY

### APPENDIX D – AGENCY CONSULTATIONS

### APPENDIX E – NATIONAL HISTORIC PRESERVATION ACT (NHPA) SECTION 106 PHASE II ARCHAEOLOGY INVESTIGATION KLEINFELDER, INC. ABENGOA ETHANOL PLANT/PROPERTIES

### APPENDIX F – AIR QUALITY IMPACT ASSESSMENT

<u>Section</u>	<u>Page</u>
F Air Quality Impact Assessment.....	F-1
F.1 Executive Summary.....	F-1
F.2 Introduction and Purpose.....	F-5
F.3 Project Background and Location .....	F-5
F.4 Model Description and Justification.....	F-6
F.5 Emission and Source Data.....	F-7
F.5.1 Description of Operations for the Proposed Action.....	F-7
F.5.2 Description of Operations for the Action Alternative.....	F-8
F.5.3 Description of Operations for the Grain-to-Ethanol Facility .....	F-8
F.5.4 Emissions.....	F-9
F.5.5 Source Parameters .....	F-11
F.5.6 Criteria Pollutant Sources and Modeled Emission Rates .....	F-11
F.5.7 Odorous Emission Sources and Modeled Emission Rates .....	F-12
F.6 Receptor Network.....	F-12
F.6.1 Fence line Receptors.....	F-13
F.7 Air Quality Grid.....	F-13
F.7.1 Sensitive Receptors.....	F-13
F.8 Elevation Data .....	F-13
F.9 Downwash and GEP Stack Height .....	F-14

F.10	Meteorological Data .....	F-14
F.11	Surface Characteristics .....	F-15
F.12	Ambient Background Concentrations.....	F-15
F.13	Odor Detection Thresholds.....	F-17
F.14	Evaluation of Impacts Compared with Standards .....	F-18
F.14.1	Criteria Pollutant Results .....	F-18
F.14.2	Odorous Compound Results .....	F-21
F.15	Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model .....	F-23
F.15.1	GREET Model of the Proposed action .....	F-24
F.15.2	GREET Model of the Action Alternative .....	F-25
F.15.3	GREET Model of the Grain-to-Ethanol Facility .....	F-26

APPENDIX G – FEDERAL REGISTER NOTICES

APPENDIX H – DISTRIBUTION LIST

<u>Section</u>	<u>Page</u>
H Distribution List .....	H-1
H.1 United States Congress.....	H-1
H.1.1 United States Senators from Kansas .....	H-1
H.1.2 United States Representative from Kansas .....	H-1
H.1.3 United States Senate Committees .....	H-1
H.1.4 United States House of Representatives Committees .....	H-2
H.2 Federal Agencies .....	H-2
H.3 State of Kansas .....	H-3
H.3.1 State Elected Officials .....	H-3
H.3.2 State and Local Agencies and Officials .....	H-3
H.4 Other States and Territories .....	H-5
H.5 American Indian Tribes and Organizations.....	H-5
H.6 Other Groups and Individuals.....	H-5
H.7 Public Reading Rooms and Libraries .....	H-6

**LIST OF TABLES**

**APPENDIX F – AIR QUALITY IMPACT ASSESSMENT**

<u>Table</u>	<u>Page</u>
F-1 Maximum impact assessment results compared with National Ambient Air Quality Standards....	F-2
F-2 Threshold and predicted concentrations of odorous compounds emitted by the Proposed Action.....	F-3
F-3 Summary of Odor Model results for the biomass-to-ethanol facility (Proposed Action) and grain-to-ethanol facility.....	F-4
F-4 Emission sources under the Proposed Action .....	F-8
F-5 Emission sources of the biomass-to-ethanol and grain-to-ethanol facilities .....	F-9
F-6 Summary of emissions under the Proposed Action.....	F-10
F-7 Summary of emissions under the Action Alternative .....	F-10
F-8 Summary of emissions under the Proposed Action with the grain-to-ethanol facility.....	F-11
F-9 Processed meteorological data capture .....	F-14
F-10 Surface characteristics used for processing the meteorological data .....	F-15
F-11 Ambient criteria pollutant background values representative of the Hugoton area .....	F-16
F-12 National Ambient Air Quality Standards .....	F-16
F-13 Odor detection threshold values.....	F-17
F-14 Summary of model results for the Proposed Action .....	F-19
F-15 Summary of model results for the Action Alternative .....	F-20
F-16 Summary of model results for the Proposed Action with the grain-to-ethanol facility .....	F-20
F-17 Threshold and predicted concentrations of odorous compounds emitted by the Proposed Action.....	F-21
F-18 Summary of Odor Model results for the biomass-to-ethanol facility (Proposed Action) and grain-to-ethanol facility.....	F-22

---

## ACRONYMS AND ABBREVIATIONS

To ensure a more reader-friendly document, the U.S. Department of Energy (DOE or the Department) limited the use of acronyms and abbreviations in this Biorefinery Project EIS. In addition, acronyms and abbreviations are defined the first time they are used in each chapter. The acronyms and abbreviations used in the text of this document are listed below.

ABBK	Abengoa Bioenergy Biomass of Kansas (also called Abengoa Bioenergy)
AERMOD	American Meteorological Society/EPA Regulatory Model
°C	degrees Celsius
CFR	Code of Federal Regulations
CRP	Conservation Reserve Program
dBA	A-weighted decibels
DOE	U.S. Department of Energy (also called the Department)
EIS	environmental impact statement
EPAct 2005	<i>Energy Policy Act of 2005</i>
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
FR	<i>Federal Register</i>
GREET	Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (Model)
K.A.R.	Kansas Administrative Regulation
NRCS	Natural Resources Conservation Service
NEPA	<i>National Environmental Policy Act</i> , as amended
PM <sub>10</sub>	particulate matter with an aerodynamic diameter of 10 micrometers or less
PM <sub>2.5</sub>	particulate matter with an aerodynamic diameter of 2.5 micrometers or less
U.S.C.	United States Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey

## TERMS AND DEFINITIONS

In this Biorefinery Project EIS, DOE has italicized terms that appear in the Glossary (Chapter 10) the first time they appear in a chapter.

## UNDERSTANDING SCIENTIFIC NOTATION

DOE has used scientific notation in this Biorefinery Project EIS to express numbers that are so large or so small that they can be difficult to read or write. Scientific notation is based on the use of positive and negative powers of 10. The number written in scientific notation is expressed as the product of a number between 1 and 10 and a positive or negative power of 10. Examples include the following:

Positive Powers of 10	Negative Powers of 10
$10^1 = 10 \times 1 = 10$	$10^{-1} = 1/10 = 0.1$
$10^2 = 10 \times 10 = 100$	$10^{-2} = 1/100 = 0.01$
and so on, therefore,	and so on, therefore,
$10^6 = 1,000,000$ (or 1 million)	$10^{-6} = 0.000001$ (or 1 in 1 million)

Probability is expressed as a number between 0 and 1 (0 to 100 percent likelihood of the occurrence of an event). The notation  $3 \times 10^{-6}$  can be read 0.000003, which means that there are 3 chances in 1 million that the associated result (for example, a fatal cancer) will occur in the period covered by the analysis.

---