Objectives
Students will be able to
• provide an overview of ethanol production;
• identify at least two different viewpoints about ethanol; and
• write an objective paper about the opinions of different people involved in the ethanol debate.

Materials
• Copies of Ethanol Viewpoint Form
• Articles and Web sites on ethanol (see the Resources section of the KEEP Web site for BioFutures and the articles).

Background
To better understand environmental issues, it is helpful to analyze the viewpoints surrounding the issue. Investigating the viewpoints involves research, observation, and critical thinking skills.

See background material from “Corn in Your Car.”

Read the articles listed below (found on the KEEP Web site in the Resource < BioFutures section) to gain a better understanding of the debate about ethanol.
• History of Ethanol Production
• Why are there disparities in the net energy value of ethanol? Read the United States Department of Agriculture’s article, “The Energy Balance of Corn Ethanol: an Update.” A summary of the article is on page iii.
• Read David Pimentel’s article “Biomass Utilization, Limits.” Section C is specifically about ethanol production.
• PowerPoint from UW Extension

Procedure
Orientation
Write the word “ethanol” on the board and ask students what they have heard or know about the topic. Note their responses.

Survey students to get an idea of their opinions and knowledge on the topic. Ask students if they think there is agreement about the use of ethanol as fuel. Help students understand that there are disagreements about the benefits of ethanol and that they are going to learn about the varying viewpoints.

Provide students with a basic description of what ethanol is and how it is made. Make sure students understand all vocabulary words.

Steps
1. Tell students they are going to investigate different people’s opinions about the positive and negative impacts of producing and using ethanol as a fuel.
2. Discuss sources where students can find articles and Web sites on ethanol. Students should mention the Internet, journal articles, news reports, and books. Invite the school librarian to speak to the class about researching information.
3. Have students work in pairs or groups of three to investigate the various viewpoints. The groups can designate responsibilities for each member. For example, one student can be responsible for looking at Web sites and newspapers. Another student can research journal articles and books. Students can use various strategies to research viewpoints. Following is one approach:
   • Each group should find at least six sources of information on ethanol. Allow about a week for students to research the information. Out-of-class assignments may be necessary.
   • Ask the group to select two sources to investigate further. At this time, students can share their choices with you to make sure a diversity of resources are being investigated.
   • Have students use the Ethanol Viewpoint Form to summarize their
findings. Review the different parts of the form. The “Viewpoint” is a one-
sentence summary that succinctly
states the author’s opinion. Students
should use the “Additional or
supplementary information” section to
explain the reasoning or background
behind the viewpoint. Ideally, students
should cite scientific facts that were
referenced within the source. The
“Source” section should include
reference information to help the reader
find the resource, but it also identifies
who authored the resource. (Knowing if
the author is a member of a certain
organization or receives funding from a
particular agency can provide insight
into motivations or influences behind
the viewpoint presented).

• Everyone in the group should read all
the sources, but each group member
can be responsible for drafting the
Ethanol Viewpoint Form for one of the
sources. They should then meet as a
group and share their work and edit and
revise the form together.

4. After the groups have investigated at
least two different sources of viewpoints
about ethanol, have each group present
their findings to the class.

5. When the students finish their presenta-
tions, have them post the Ethanol
Viewpoint Form on the wall. Challenge the
class to group similar or related viewpoints
together. They can create a diagram similar
to the one on the next page, where ethanol
is in the center and the viewpoints are
grouped around the center.

Closure
Have students summarize the various opin-
ions presented in the diagram (Step 5).
Were they aware of these different view-
points before they conducted this research?
Why do students think there are varying
opinions?

Ask students to present their own view-
points (compare to the survey conducted in
the orientation). Do they find themselves
agreeing with one or more of these view-
points? Generate a list of questions about
what else they would like to know about
ethanol before they form an opinion.

Have students examine their energy use in
relation to transportation.

NOTE: You can also conclude the activity
with a debate on the pros and cons of using
ethanol. You can divide students into
groups and assign them each a role to play
(farmer, politician, feed company president,
investor, etc.).

Assessment

Formative
• Did students use effective research
strategies to identify a variety of different
viewpoints about ethanol?
• By reading students’ Ethanol Viewpoint
Forms, can the reader quickly understand
the viewpoint of the source?
• Were students able to group similar view-
points together?

Summative
Have students write an informative article
about ethanol and the various viewpoints
involved. Encourage students to be object-
ive and not to favor any viewpoint. Discuss
the challenges with developing a paper of
this format and the strategies they use to
remain impartial. They can submit the arti-
cle to the school newspaper or their local
paper.

Extensions
Have students each pick a viewpoint and
stage a debate.

Take students on a field trip to an ethanol
production facility or invite staff from the
facility to come be a guest speaker in the
classroom.

Resources:
Web sites
Making Ethanol --
www.canren.gc.ca/tech_appl/
index.asp?Cald=2&Pgld=116
Powering Cars with Ethanol --
www.canren.gc.ca/tech_appl/
index.asp?Cald=2&Pgld=117
Ethanol Across America --
www.ethanolacrossamerica.net
/education.html
All About Ethanol --
www.ethanol.org/
Renewable Fuels Association --
www.ethanolrfa.org
Ethanol Promotion and
Information Council --
www.drivingethanol.org
Opposition to Ethanol --
www.energyjustice.net/ethanol/
Books
Helen Cothran (Ed.). Energy
Alternatives: Opposing Viewpoints.
San Diego: Greenhaven Press,
2002.
Francis S. Sterrett (Ed.) Alterna-
tive Fuels and the Environment.
Neil Schlager and Jayne Weisblat
(Ed.). Alternative Energy. The
Thomson Corporation.
**Viewpoints**

**Pro-Ethanol Viewpoint**
- Net Energy Value (NEV) is positive
- Good for Wisconsin’s farming economy
- Low air pollutant emissions

**Anti-Ethanol Viewpoint**
- Net Energy Balance (NEV) is negative
- Not enough corn for food and/or feed
- More research needed

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**Ethanol** – (Issues) Viewpoints that think there is not enough corn for food or feed. Viewpoints that think the Net Energy Balance is negative. Viewpoints that think the net energy balance is positive. Viewpoints that think there should be more research.

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**Viewpoints**

Viewpoints that think ethanol is not a good option for alternative fuel.

Viewpoints that encourage the use of ethanol as alternative fuels because it is good for the economy of Wisconsin.

Viewpoints that state we would not benefit from using crops for fuel.

Viewpoints that think ethanol is a good option for alternative fuel.
Ethanol Viewpoint Form

Viewpoint
Write a one or two sentence summary for the information in this source.

Additional or supplementary information

Source
Author or organization:

Title (of article or Web site):

Title of book or journal:

Date:

Other reference information (Web site address or volume number):