

Pork Power!

QUEST Nebraska Education Guide: A resource for using QUEST Nebraska stories in the classroom

Watch online: <http://quest.netnebraska.org/>

QUEST NEBRASKA SUBJECTS

Science
Technology
Engineering
Mathematics

NEBRASKA SCIENCE STANDARDS

Grade 6-8

Physical Science

SC8.2.1 Students will identify and describe the particular nature of matter including physical and chemical interactions

Grade 9-12

Physical Science

SC12.2.1 Students will investigate and describe matter in terms of its structure, composition and conservation

Grade 6-8

Earth and Space

SC8.4.2h Students will classify Earth materials as renewable or nonrenewable

Grade 9-12

Earth and Space

SC12.4.3c Compare and contrast benefits of renewable and nonrenewable resources

PROGRAM NOTES

On Dan Kluthe's hog farm near Dodge, Nebraska, electricity is being made out of hog waste. The first animal methane digester in the state has been in operation for a few years now. The process disposes of the waste, eliminates methane, a greenhouse gas more pollutant than carbon dioxide and creates enough energy for 40-50 homes. The waste-to-resource process is important to making agriculture more sustainable.

“The raw manure goes down the digester where we’ve got bacteria – lots of bacteria – and the bacteria in there just multiplies like bacteria does and breaks down the manure and it comes out as a liquid” Kluthe

“The bacteria in there gets fed every day. Every day I feed about a quarter of a pit to the digester and every day the hogs replace it. That is renewable!” Kluthe

100 degrees is the ideal temperature for the bacteria to breakdown the manure and release methane gas, (Chemical composition = CH₄) a process that takes about three weeks. The pit traps the methane in its oxygen-free environment that Kluthe then uses the methane as fuel (for) the farms utilities.

“We capture methane so it’s environmentally friendly and green power is – is pretty awesome, you know, and when I was talking about taking hog manure...taking electricity out of it and everyday hogs replace it, now that’s as “renewable” energy as you can get.” Kluthe

How does Anaerobic Digestion work?

http://www.energysavers.gov/your_workplace/farms_ranches/index.cfm/mytopic=30003

Resources

<http://www.epa.gov/agstar/> - created by US Federal Government to answer questions about anaerobic digestion

<http://uw.kqed.org/edresources/plans/lesson-4c-turning-waste-into-energy.pdf?trackurl=true>

<http://www.pbs.org/wgbh/nova/insidenova/2011/01/cinema-science-the-power-of-waste.html>

www.npr.org – type “methane digester” in search bar for related resources

<http://nebraskafarmer.com/library.aspx?plc=0&lc=0&ls=543&pv=1>

VOCABULARY Research and define

Environment

Anaerobic Digestion

Bacteria

Methane

Ecosystem

Renewable Resources

Non-renewable
Resources

Focus Questions

NOTE: You may choose to watch the television segment twice with your students: once to elicit emotional responses and get an overview of the topic and again to focus on facts and draw out opinions.

- What do you already know about Methane Gas in the atmosphere?
- Diagram the steps in converting a gas into electricity.
- What are some of the effects of developing an anaerobic digester for energy production? What are the positive effects? Negative effects?
- How does this story affect you personally?

Dig Deeper:

The hog waste must be heated to 100 degrees for methane to be released. How does that happen? Why is that important?

Diagram the cycle of matter in the Kluthe Farm Methane Digester

- **Where does the solid mass go?**
- **Diagram the flow of energy**
- **What is given off?**
- **What is the “waste?” Where does it go?**

For additional classroom instructional resources, please check out:

- Segment Summary Student Sheet
http://www.kqed.org/quest/downloads/QUEST_SegSum_StudentSheet.pdf
- Personal Response Student Sheet
http://www.kqed.org/quest/downloads/QUEST_PersResp_StudentSheet.pdf

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www.education.ne.gov

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www.ops.org

Lincoln Public School

www.lps.org

Nebraska Academy of Sciences

www.neacadsci.org

Nebraska Association of Teachers of Science

www.neacadsci.org/nats/index.htm

Omaha's Henry Doorly Zoo

www.omahazoo.com

University of Nebraska State Museum

www-museum.unl.edu

Boys/Girls Club of the Midlands

www.bgcomaha.org

Girls Inc. of Omaha

www.girlsinomaha.org

MORE EDUCATIONAL RESOURCES FOR USING QUEST MULTIMEDIA TO ENHANCE 21st CENTURY SKILLS IN TEACHING AND LEARNING

Why Use Multimedia in Science Education?

<http://www.kqed.org/quest/downloads/QUESTWhyMedia.pdf>

- Read about the importance of using multimedia in the 21st century science classroom.

How to Use Science Media for Teaching and Learning

<http://www.kqed.org/quest/downloads/QUESTMediaTips.pdf>

- A collection of tips, activities and handouts to actively engage students with multimedia.

Science Multimedia Analysis

<http://www.kqed.org/quest/downloads/QUESTMediaAnalysis.pdf>

- Give your students the tools to recognize the purposes and messages of science multimedia.

Create Online Science Hikes with Google Maps

http://www.kqed.org/quest/files/download/52/QUEST_ExplorationCreation.pdf

- Do you like the science hike Explorations on the QUEST site? Use this place-based educational guide to create similar science-based maps with youth.

Media-Making Toolkit for Science Education

<http://www.kqed.org/quest/education>

- Are you interested in integrating media making into your classroom or science education program? Find instructions, worksheets and rubrics for implementing simple media-making projects with students.

MORE QUEST



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