

# Alternative Fuels

## Education & Outreach

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EAST TENNESSEE  
**CLEAN  
FUELS**



ETCleanFuels.org

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# Pre-K & K Outreach

- Topics Covered:

- Air Pollution
- Oil Spills
- Clean Transportation

- Activities:

- Interactive Cloud Activity
- Oil & Water Demonstration
- Coloring



# 1<sup>st</sup> & 2<sup>nd</sup> Grade Outreach

- Topics Covered:
  - ❑ Oil Spills
  - ❑ Air Pollution
  - ❑ Clean Fuels
- Activities:
  - ❑ Story Time
  - ❑ Oil & Water Demonstration
  - ❑ Coloring
  - ❑ Snack: Popcorn or Edamame



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# 3<sup>rd</sup> & 4<sup>th</sup> Grade Outreach

## ■ Topics Covered:

- Air Pollution
- Oil Spills
- Oil Exploration & Process
- Biodiesel
- Ethanol

## ■ Activities:

- Biodiesel Process Demonstration
  - Oil & Water Demonstration
  - Oil Exploration & Process Timeline Game
  - Snack: Popcorn & Edamame
  - Word Find
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# 5<sup>th</sup> – 12<sup>th</sup> Grade Outreach

- Varied education levels
- 45-60 Minute Period
  - Includes:
    - PowerPoint Presentation
    - Short Jeopardy Game
    - Prizes for winners and participation
- 90 Minute Period
  - Includes:
    - Word Scramble
    - PowerPoint Presentation with Mythbuster game
    - Jeopardy Game
    - Prizes for winners and participation



# U.S. Air Quality in 2009

## Ozone

## Particulate Matter

<u>City</u>	<u>Orange Days</u>	<u>Red Days</u>	<u>Purple Days</u>	<u>Orange Days</u>	<u>Red Days</u>	<u>Purple Days</u>
Bronx	12	2	0	31	0	0
Chicago	41	5	0	43	0	0
Colorado Springs	12	0	0	0	0	0
Fargo	0	0	0	0	0	0
Knoxville	70	0	1	21	0	0
Los Angeles	185	55	11	77	6	0
Maryville	77	1	0	8	0	0
Nashville	24	2	0	22	0	0

Orange = Unhealthy for sensitive populations

Red = Unhealthy

Purple = Very Unhealthy

Source: American Lung Association

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# Current U.S. Gasoline Consumption

375,000,000 gallons per day

11,400,000,000 gallons per month

**137,000,000,000 Gallons per  
Year**

In 2008 Americans spent ~\$350 billion on gasoline and \$12.8 billion on charitable donations to health organizations

# Biodiesel

## Advantages vs.

- American-made and renewable
- Reduces air pollution by up to 75%
- Not poisonous/toxic
- Don't have to change existing car



## Disadvantages

- Fuel filter can clog after first time use
- An anti-freeze is needed in cold weather



**Glacier Nat'l Park, Montana**

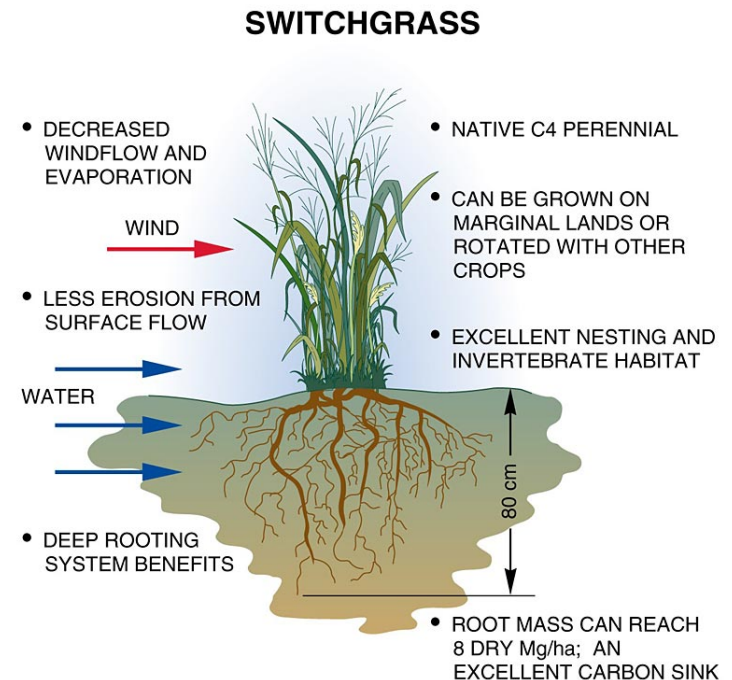
*photo from biodiesel.org*

# Switchgrass

- Native to TN
- Only have to replant every 10-20 years
- Delivers an average of 13.1 megajoules of energy for every megajoule of petroleum consumed
- Makes 1,150 gallons of ethanol for one acre of land



ORNL-DWG 93M-8892



# What Can You Do?

## Conservation and Fuel Efficiency

### #1: Use alternative fuels

- ❑ Talk to your parents about buying an FFV
- ❑ Make your school a Clean Fuel School



### #2: DRIVE LESS!!!

- ❑ Carpool, Walk, Bike, Bus

### #3: Little things count

- ❑ Drive the speed limit
- ❑ Don't drive aggressively
- ❑ Properly inflate your tires
- ❑ Idle less



# ETCFC JEOPARDY!

Effects of Pollution	Biodiesel	Ethanol	Oil Dependence
<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
<u>200</u>	<u>200</u>	<u>200</u>	<u>200</u>
<u>300</u>	<u>300</u>	<u>300</u>	<u>300</u>
<u>400</u>	<u>400</u>	<u>400</u>	<u>400</u>
<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>

Final Jeopardy Round



DAILY.

DOUBLE.



DAAILY.

DOUBLE.



A health effect for humans due to  
petroleum pollution



#1 greenhouse gas emitted by  
transportation sector



An effect of petroleum pollution,  
other than human health effects



This state has the worst air quality  
in the nation



2 of the 5 most significant  
pollutants from petroleum fuel



# Alternative fuel for diesel engines



Crop or other source that can be  
used to make biodiesel



# 1 Advantage of biodiesel



Source that can make the most  
biodiesel per acre



# 1 Disadvantage of biodiesel



# Alternative fuel for gasoline engines



Crop that can be used to make  
ethanol



Native grass to East Tennessee,  
used to make cellulosic ethanol



# 1 Advantage of ethanol



# 1 Disadvantage of ethanol



Country that uses the most oil in  
the world



The decade the U.S. production of  
oil peaked



The U.S. buys most of its oil from  
this country



Amount of gasoline used in the  
U.S. each year



Country that has the largest oil reserves in the world

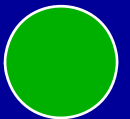


# What is

- ~ Cancer
- ~ Respiratory illnesses
- ~ Heart ailments
- ~ Reproductive problems



What is CO<sub>2</sub>, Carbon Dioxide?

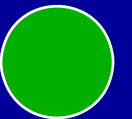


# What is

- ~ Climate Change
- ~ Oil spills and process
- ~ Effects on animals
- ~ Effects on plants
- ~ Deterioration of buildings  
and monuments



What is California?

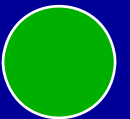


# What are

- ~ Particulate matter
- ~ Hydrocarbons
- ~ Nitrogen oxides
- ~ Carbon monoxide
- ~ Carbon dioxide



What is biodiesel?



## What are natural oils:

- ~ Soybeans
- ~ Vegetable oil
- ~ Sunflowers
- ~ Animal fats
- ~ Leftover cooking oil
- ~ Algae

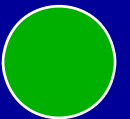


# What is

- ~ Domestic and renewable
- ~ Less pollution—smoke, smell, noise
- ~ No new vehicles required
- ~ Fill-n-go option at  $\leq$  B20
- ~ Less wear and tear
- ~ Cost competitive most of the time
- ~ Biodegradable, nontoxic



What is algae?

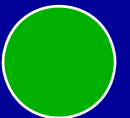


# What is

- ~ Fuel filter can clog
- ~ Gels faster than diesel, so precautions must be taken during wintertime use



What is ethanol?

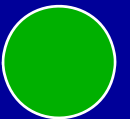


# What is

- ~ Corn
- ~ Sugar cane
- ~ Switchgrass
- ~ Virtually any plant fiber



What is switchgrass?



# What is

- ~ Domestic and renewable
- ~ Less pollution
- ~ Cost competitive
- ~ Increased power
- ~ Fill-n-go option at < E10
- ~ FFVs are available and affordable

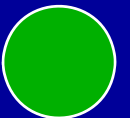


## What is

- ~ Lower fuel efficiency
- ~ Higher blend requires vehicle capable of handling level of alcohol
- ~ Infrastructure—parts replaced or new equipment
- ~ Getting heat in food vs. fuel debate



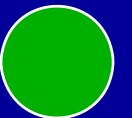
What is the U.S.?



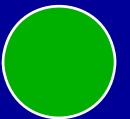
What is early 1970s?



Who is Canada?



What is 137 billion gallons?



Who Saudi Arabia?



# FINAL JEOPARDY

Name 4 ways that you can decrease air pollution

[Click for  
Final  
Jeopardy  
Answer](#)



# FINAL JEOPARDY

What is

- ~Buy a FFV
- ~ Have your school become a Clean Fuels School
- ~ Carpool, bike, walk, bus
- ~Drive the speed limit
- ~Inflate your tires properly
- ~Lower the AC
- ~Idle less
- ~Don't drive aggressively
- ~Travel light