Chapter 13
Achieving Energy Sustainability

Major objectives

- Students will understand what Biogas is part of a goal for California to use 33% Renewable Energy by 2020.
- Students will learn how our region is using it's two most prominent sources of renewable energy (Solar and Biogas) to be more sustainable.

Advertisement!

- Farm to Fork Festival
- September 27th
- 10 am – 6 pm
- Capital Mall- Downtown

Sacfoodies.com

Problem: Increase in [CO_2] in Atmosphere leads to Global Warming and Climate Change

- **Solution:** Decrease the amount of [CO_2] in the atmosphere by powering vehicles with methane instead of traditional fossil fuels such as gas.

Lesson Overview:

Students will learn and train other students and staff at RCHS about how to use their food waste for collection in an anaerobic digester for microbes to produce methane. The methane (CNG) will then power vehicles instead of fossil fuels, decreasing our carbon footprint. River City High School will be part of a sustainable solution to today's energy needs and part of a closed loop system of reusing resources to help meet our CA sustainability goal of using 33% Renewable Resources by 2020.

- Students will also learn how to use puppet pals or educreate or another video production resource, power point or create a trifold to advertise and teach how to collect food waste for biodigestion.

Sometimes Biodigestion is confused with Composting.

- Ingredients in Composting:
  - Vegetable & fruit scraps, egg shells, coffee grounds, and worms such as red wigglers.
- Purpose of Composting:
  - To create healthy productive soil for the garden.

Biodigestion is different from Composting

- Ingredients in Biodigestion:
  - All food waste. Meat, eggs, oil, bread, vegetable and fruits scraps, milk, liquids, any food.
- Purpose of Biodigestion:
  - To create Methane (CNG) to power vehicles or generate extra electricity to power the grid during peak times.

Expected Student Outcomes:

- Students will need to use a computer to navigate the web to research biodigestion, companies, or industries that are relevant. Students will hone their researching skills for relevant information on the topic.

- Students will teach themselves how to use educreate and/ or puppet pals to create a video that is viewer ready. Students will improve their editing, public speaking and research skills.

- Some students will need access to the video production class or students in it, to record a video about biodigestion, how it is different from composting and how food waste will be collected. Students will improve their public speaking skills.

- Some students will use Microsoft Publisher to create a trifold that advertises the benefits of the refuel program, and how students and staff at RCHS (River City High School) can be part of the solution to close the loop on our resource use. Students will hone their creative and editing skills.

Expected Student Deliverables:

- The students in groups of 4 or less will create a video, or speech or a trifold about Clean Natural Gas as a renewable energy source using the Farm to Fork to Fuel Program. They will compare and contrast Biodigestion to Composting to educate the staff and students at RCHS so we can be more sustainable as a campus.

- All quality videos will be viewed from the S drive (River City High School) to advertise the collection of food waste, and the how and whys of the Refuel program. If students choose to produce a trifold all quality trifolds will be photocopied and passed out at Breakfast and Lunch to advertise the program. All work will be graded, only A quality work will advertised.
- Students who are willing can present their experience at the School Board Meeting October 9th.

9/19 Agenda

- Video: http://bcove.me/5rhw93qz
- http://www.cemexusa.com/Sustainability/EnergyEfficiencyBuildings.aspx

Biomass is energy from the Sun

- The Sun is the ultimate source of almost all types of energy
- Most Common form of Renewable energy
- Wood, Charcoal and Manure- used to heat homes throughout the world.
- Ethanol and Biodiesel (biofuels, Biogas – Methane or CNG)- used as substitutes for gasoline and diesel fuel.

Figure 13.9a
Environmental Science

Figure 13.9b
Environmental Science

In the Sacramento Region…

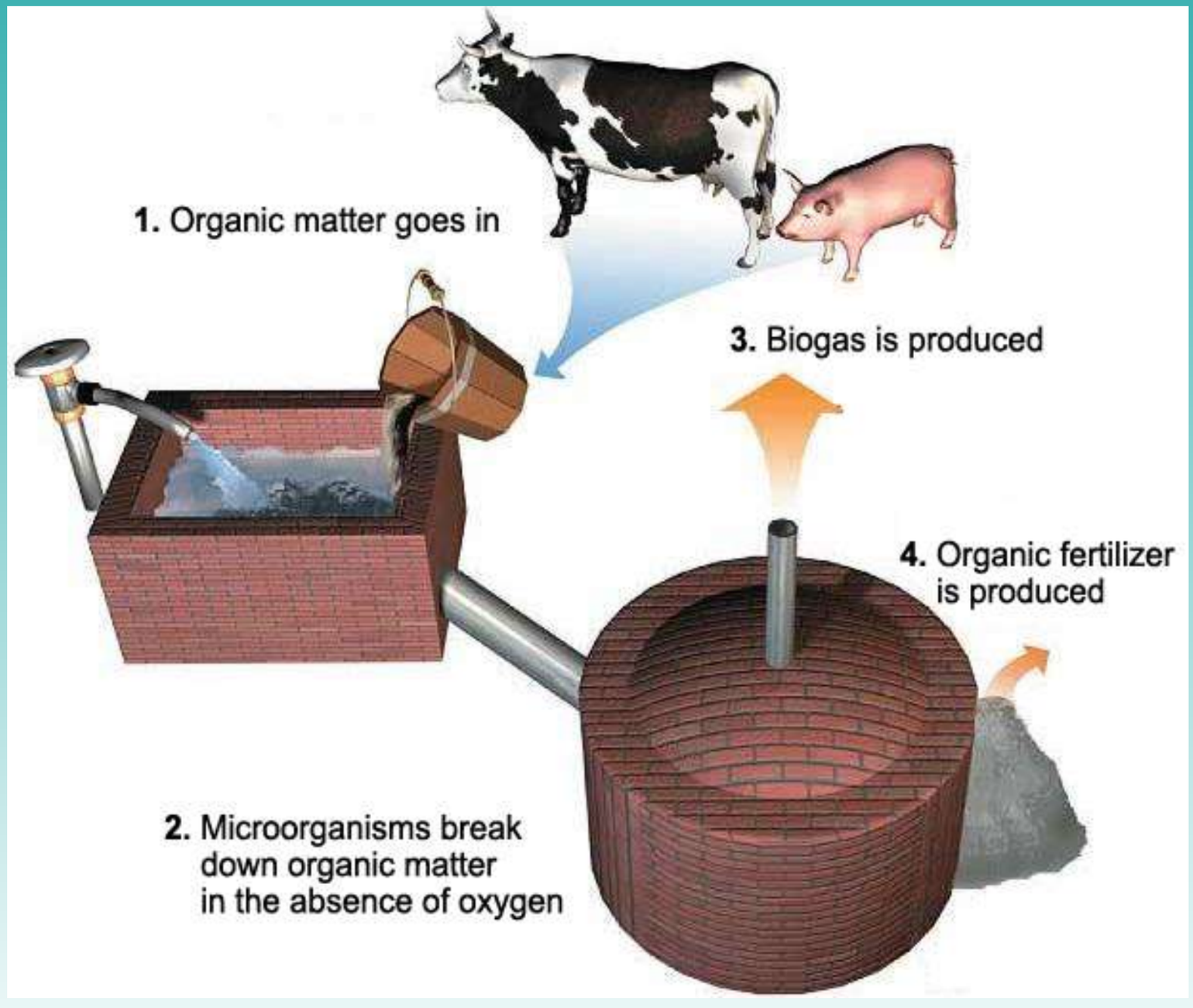
Two most beneficial forms of Renewable Energy are:

•Solar

•Biomass/ Biogas

- **Biodigestion of Food Waste for Methane production to power CNG vehicles or electricity for the grid.**
- Biodigestion of Manure for methane production to convert to electricity to power the grid during peak energy times.

Biogas Production for electrical energy



Green energy

Figure 13.11
Environmental Science

RESOURCES

- Video: Solar Energy “Saved By The Sun” NOVA
- Who Killed the Electric Car?
- Solar: www.solarbuzz,com
- www.solarenergy.com
- www.seia.org
- Wind: www.awea.org
- www.bwea.com
- Geothermal: www.sandia.gov/geothermal
- http://www.eia.doe.gov/kids/energy.cfm?page-geothermal-home-basics
- Water: http://ga.water.usgs.gov/edu/hyhowworks.html
- http://www.energy.ca.gov/tour/

In case you were wondering how cool RCHS is…

- We are Farm-2 – Fork- 2- Fuel
- We have the Garden (Farm), we feed students in the Cafeteria (Fork), and we collect food waste (Refuel) to be converted to CNG to power vehicles.

Benefits of F 2 F

- Food is locally grown with in 50 – 100 miles of where you live.
- Most of the food Americans eat travels over 2000 miles.
- The food is more nutritious because it is fresher.
- Less pollution is created in eating locally.
- You can actually meet your grower, or distributer.
- Promotes and supports the local economy
- Pride in your crop.