

# Energy in Rural China

## Learning Goals:

- Review the five types of renewable energy
- Play an energy game (renewable vs. non-renewable energy)
- Learn three ways that engineers help people who do not have much money use cleaner sources of energy



# Five Types of Renewable Energy

solar

water

wind

geothermal

biomass



# Energy Game

Let's see how much you know about energy and how fast you can decide!

- If the picture shown is a **renewable** energy source (that means it can be used over and over again), then **stand UP**
- If the picture shown is a **non-renewable** energy source (that means when we use it, it gets used up), then **sit DOWN.**



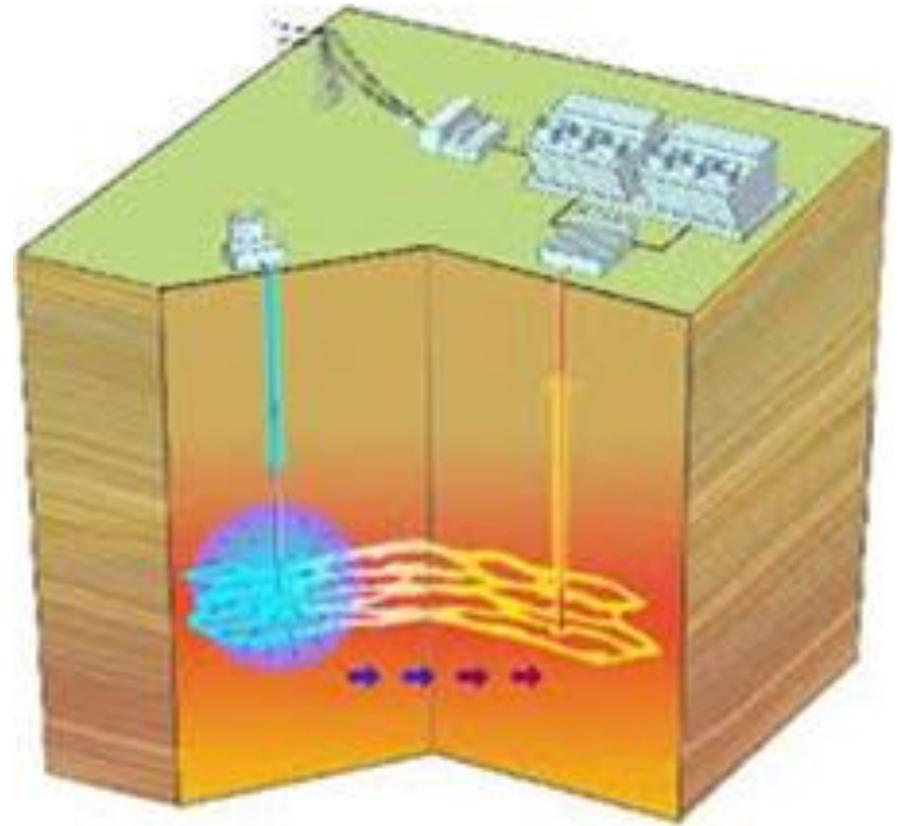
# Coal



Renewable

✓ Not

# Geothermal



✓ Renewable

Not

# LPG



Renewable



Not

# Biomass



 Renewable

Not

# Solar Electric



Renewable

Not

# Nuclear



Renewable



Not

# Wind power



Renewable

Not

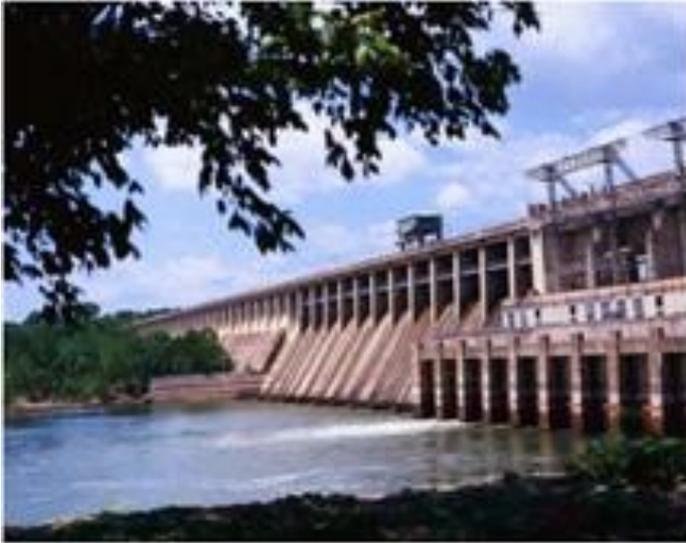
# Solar hot water



Renewable

Not

# Hydropower



Renewable      Not

# Gasoline



Renewable



Not

# Biogas



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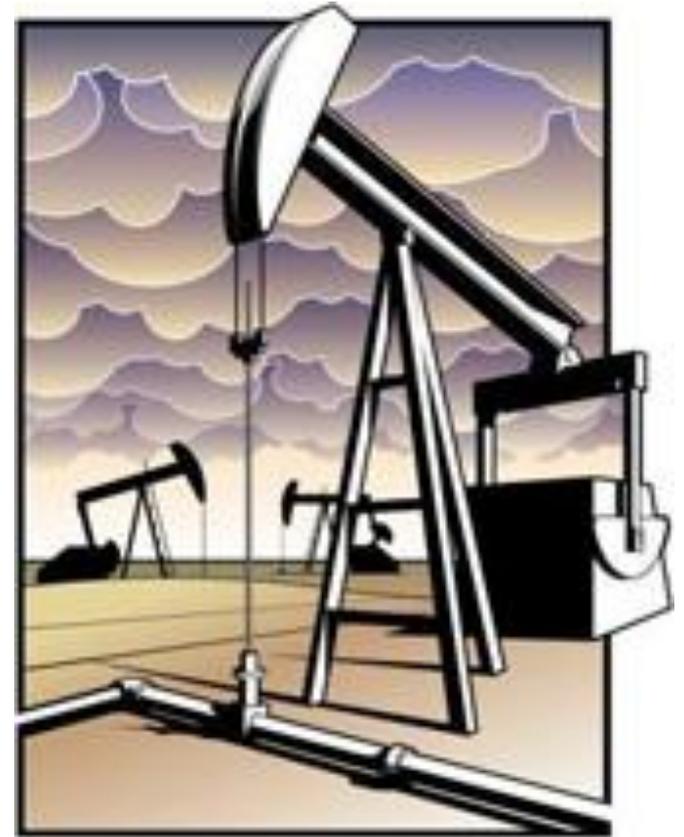


Renewable

Not



# Oil



Renewable



Not



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# The energy we use affects the planet

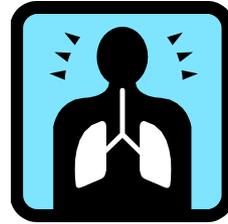


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# The energy we use affects our health



# Cookstoves in Rural China



- Many families in China use small coal stoves to cook meals
- ← **typical coal cookstove**
- Using coal in this way produces lots of emissions that are very harmful to people's health
- Millions of people around the world die from the results of indoor air pollution every year



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# Homes in rural China

**People in the countryside generally don't have much income (money).**

***How can engineers help people in the countryside use clean energy in ways that they can afford?***



# How Engineers Can Help

- Three ways that engineers have helped families without much money use cleaner energy are by designing:
  - Biogas digesters
  - Solar hot water systems
  - Improved cookstoves

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# Biogas Digesters



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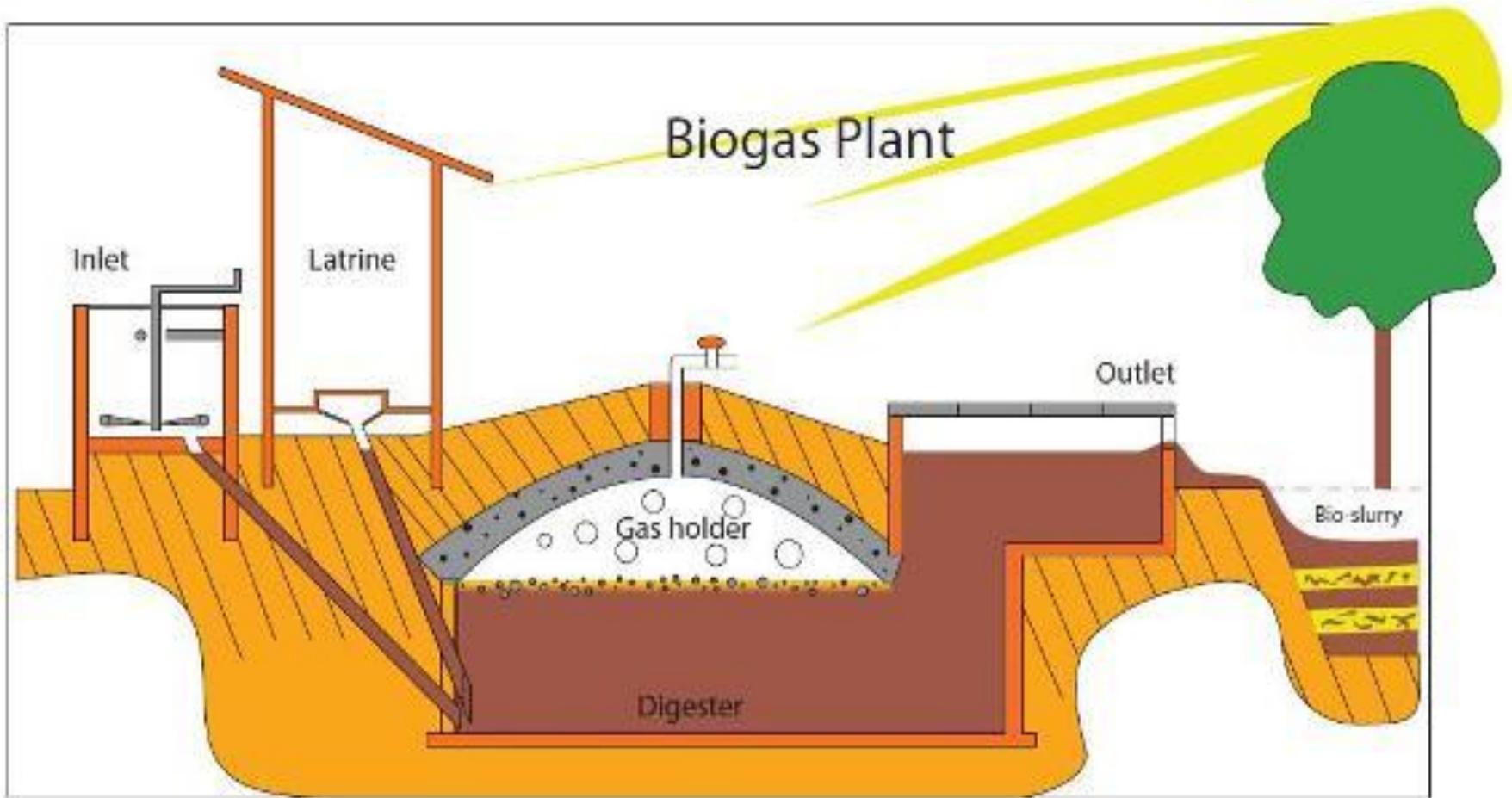


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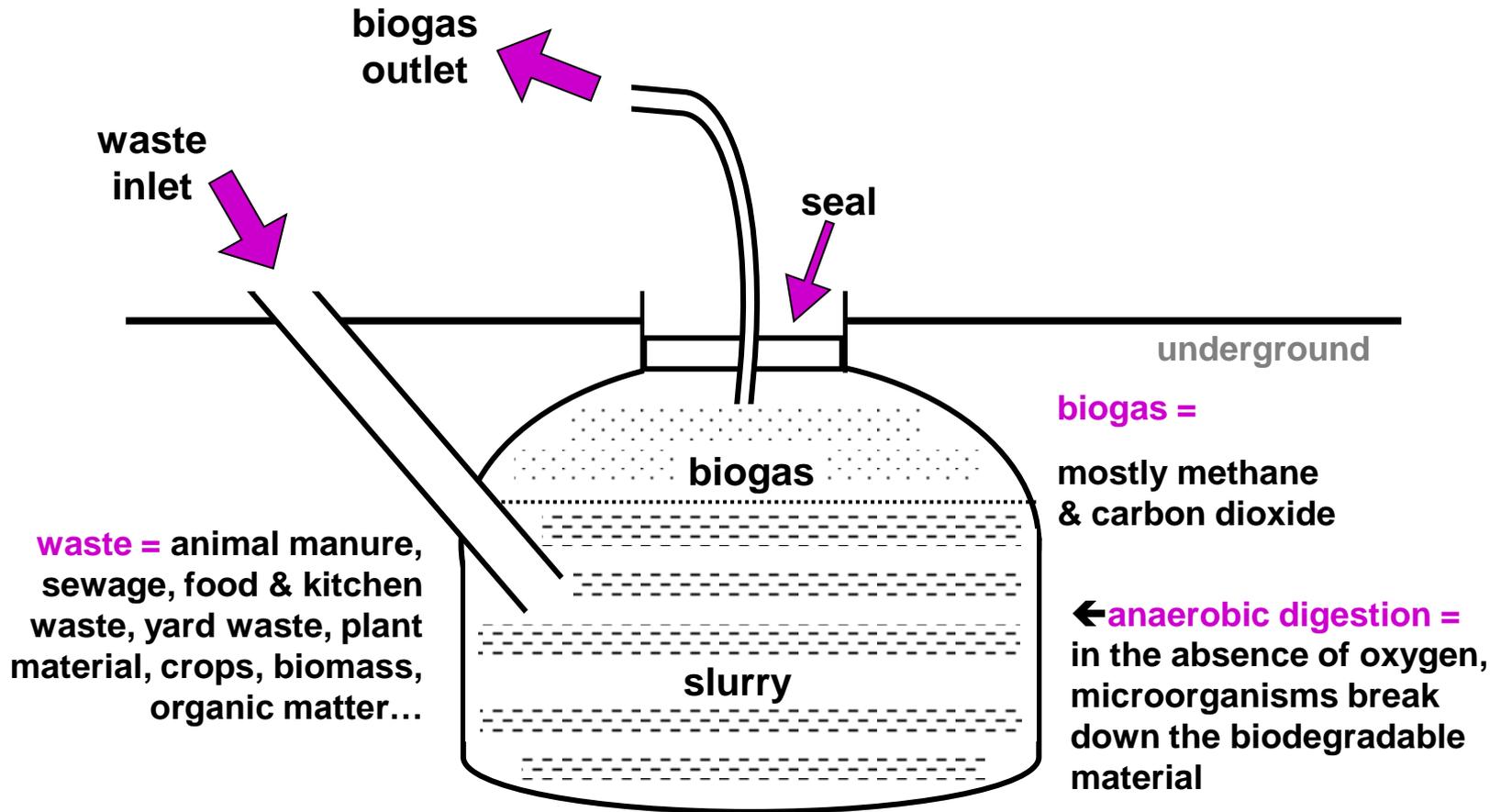


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**Biogas digesters collect waste from crop waste, pigs, and the latrine in an underground tank. All of the waste digests in the tank and produces a gas that the family can use for cooking.**



# Biogas Digesters



# Solar Hot Water

- Solar hot water systems can be placed on the roofs of homes.
- These systems can be quite inexpensive.
- The energy from the sun heats up the water.
- Families can use the hot water for cleaning and hot showers!



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# Improved Cookstoves



- Engineers are designing small cookstoves that are strong, inexpensive, fit the culture where they are being used, use less fuel, and produce fewer emissions.

← Envirofit cookstove



- It's a big task, but it can make a big difference in helping people's health — all around the world!

Copyright 2011 Envirofit, <http://www.envirofit.org/cookstoves/g-3300.html>. and <https://picasaweb.google.com/103081190550091286089/EnvirofitCustomersCleanCookstoves#5522717745219714354>. Used with permission.

# Optimization

- Our activity for today is to optimize rural energy solutions.
- To *optimize* something means to find the very best solution.
- You will work together in teams to find the best solutions for meeting rural families' energy needs.



**Coal waiting to be used...  
Can we find a better solution?**

# This family needs energy for:

- cooking
- heating water
- lighting
- heating the house
- watching TV
- washing clothes



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# Energy Source Options

Cooking	Heating	Lighting & Other Electricity	Hot Water
coal	coal	coal	coal
biomass	biomass	hydropower	biomass
natural gas	natural gas	solar power	natural gas
biodigester	geothermal	wind	solar hot water
solar power		biodigester	biodigester

**Some types of energy are cleaner than other types, and some are more expensive.**

**How can we make the best decision (*optimize*) between spending money and protecting people's health and the health of the environment?**

# Teamwork

- **Work together with your partner to choose which type of energy to use for heating, cooking, lighting and hot water**

**The BEST solution will have the lowest cost *and* the lowest impact on the environment**

**You can do it!**



# Learning Goals Summary

## Five types of renewable energy:

- wind, water, solar, biomass, and geothermal (includes solar hot water and biogas digesters)

## Non-renewable energies:

- coal, natural gas, nuclear, gasoline, oil

## Three ways engineers help to inexpensively bring cleaner energy to families in China:

- biogas digesters, solar hot water, and improved cookstoves

## The best cookstove solutions should be:

- robust, inexpensive, fit the culture, use less fuel, and produce fewer emissions



# the end

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