

# CHOICES FOR OUR ENERGY FUTURE

## Sign in to High adventure Science

→ Website:

<https://has.portal.concord.org/>

### Login:

1. Click "Sign Up" and register as a student.
2. Login with your new username and password
3. Enter Class Code: (see the board)
4. Click "Run by Myself" on the module (orange button)

### Directions:

We will be participating in Module 1 (Energy Sources) and Module 2 (Extracting Gas from Shale) both as a class and independently. Follow the instructions carefully and record answers below:

### HAS MODULE 1

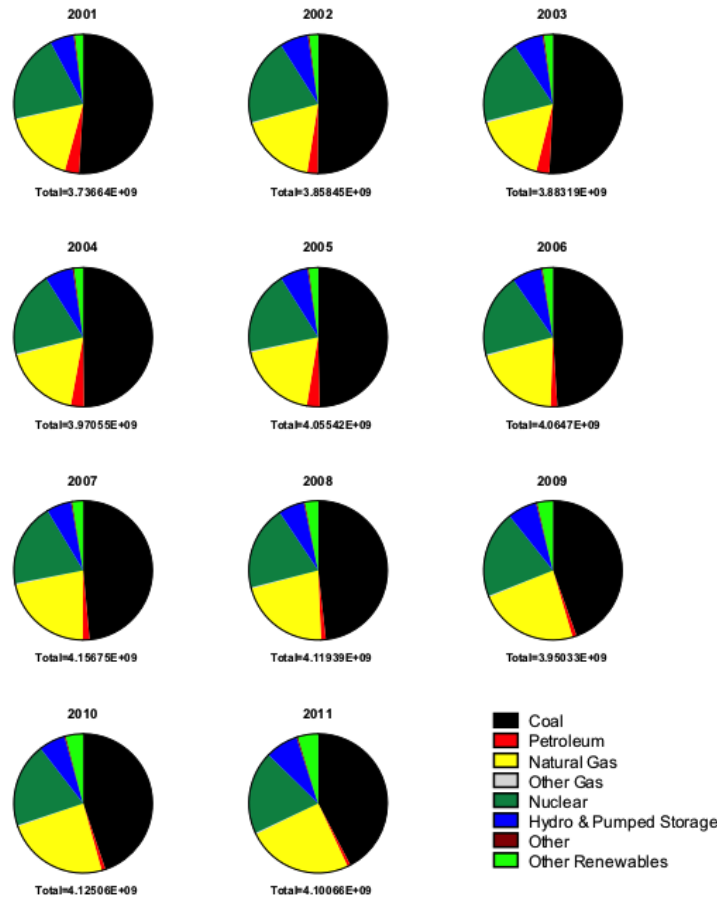
1. Click on Module 1: Jump to the "3" button- located on top right corner of the screen.  
Interact with the map to answer the questions below:
  - a. How is electricity generated in your state?
  - b. How did the fuel sources for electricity in your state change between 2001 and 2010?
  - c. How did the fuel sources for electricity in the United States as a whole change between 2001 and 2011?
  - d. Which state had the biggest changes in fuel sources for electricity from 2001 to 2010?
  - e. Describe the changes in fuel sources for electricity in that state.
2. Use the following image to answer questions about Energy Generation

- a. What changes occurred in the mix of fuel sources used to generate electricity in the United States between 2001 and 2011?

**Highlight your choice for each use:**

- |      |                      |          |            |
|------|----------------------|----------|------------|
| i.   | Coal use             | decrease | stays same |
|      | increase             |          |            |
| ii.  | Nuclear use          | decrease | stays same |
|      | increase             |          |            |
| iii. | Natural gas use      | decrease | stays same |
|      | increase             |          |            |
| iv.  | Hydroelectric use    | decrease | stays same |
|      | increase             |          |            |
| v.   | Renewable Fossil Use | decrease | stays same |
|      | increase             |          |            |

## Electricity Generation, United States



## HAS Module 2: Extracting Gas From Shale

**Directions:** Sign in to your HAS account. Enter Module 2: Extracting Gas From Shale. Hit Button 2. Read the paragraph about Shale and answer the following questions.

2. Rocks and sediments vary in their **porosity** (space that can hold liquid or gas).

What do you think is the porosity of the shale that makes it able to hold gas?

(Circle one)

high porosity

low porosity

3. Rocks and sediments vary in their permeability (ability of liquid or gas to flow through the rock).

What do you think is the permeability of the shale that makes it able to hold gas?

(Circle one)

low permeability

high permeability

4. Explain your answers to questions 2 and 3.

**Click -Next-**

5. Examine the Map, Where in the United States are most of the known shale gas reserves located?

**Click Next (or button 4) read the paragraphs, watch the animation and answer the following questions.**

6. Now that you have read these paragraphs and looked at where shale exists in the United States, explain what this information tells us about the geologic history of those areas?

7. The Marcellus Shale, which is found at the northern end of the Appalachian Mountains, was formed during the Devonian period. (390-359 Million years ago) The Appalachian Mountains did not exist during the Devonian period. What did that area look like during the Devonian?

**Click on Button 6. Follow the Teacher's instructions to drill your fracking well and answer the questions below.**

9. What needs to be done to access the natural gas that's trapped in shale? Explain the process of fracking.

10. Water is used during the hydraulic fracturing process.  
How is the water used?

What happens to the water afterwards?