

Activity: Renew-A-Bean

Purpose

The sources that provide the energy we use every day can be divided into two different groups: Renewable and Non-Renewable. Renewable energy sources are those that we can use over and over again. Non-Renewable energy sources are those that are used and cannot be recreated in a short period of time. In this activity you will be given a bag of “energy beans.” Each bag contains energy provided by both renewable (white beans) and non-renewable (brown beans) sources. You will “use” the energy provided by both types of sources by randomly picking beans from a bag – some of the “energy” you use will be renewable, some will be non-renewable. You will see what happens to the renewable/non-renewable energy sources that remain after many years of energy use.

Equipment

1. One plastic bag containing 90 brown kidney beans (representing non-renewable energy resources) and 10 white beans (representing renewable energy resources).
2. Calculator
3. Pencil

Procedure

1. Split into groups of 2-3 students.
2. Collect all equipment and materials necessary to conduct the activity.
3. Part 1: Have one person from each group pick out 10 “energy beans” from the bag, without looking. These 10 beans represent the energy that is used in one year.
4. Count the brown and white beans and record the number on the attached data collection sheet for Year 1.
5. The brown beans represent energy from non-renewable energy sources, so when a brown bean is picked it cannot be returned to the bag (place it aside). The white beans are renewable energy beans, so they should be put back into the bag each turn after counting them.
6. Let another person from the group pick 10 beans to represent energy use in Year 2. Fill in the number of brown and white beans on the chart, and return the white beans as in step 5.
7. Repeat the process, returning all white beans to the bag after each person’s turn, until 20 years have passed or until all the brown energy beans are gone.
8. Part 2: Consider the growing use of power and energy over time. Repeat steps 3 through 7, but increase the amount of energy use by picking out 5 additional “energy beans” each year (pick 10 beans in year 1, 15 beans in year 2, 20 beans in year 3, etc.). Record information on the attached data collection sheet.
9. Complete the concluding questions.

Conclusions

1. How many years did it take for the non-renewable energy sources to run out when you used 10 energy beans per year?
2. How many years did it take for the non-renewable energy sources to run out when you increased the rate at which we consumed resources each year (part 2)?
3. What are some examples of renewable and non-renewable energy sources?
4. What does this activity demonstrate about our consumption of resources - what will happen if we keep using non-renewable resources?
5. Describe what happens to the proportion of renewable vs. non-renewable energy sources that remain available, as energy is used over time.

**Data collection for renew-a-bean –
Part 1: No increase in the number of beans used each year**

Year	Total beans removed	Number brown beans	Number white beans	Percent of beans that are renewable <i>$\frac{\text{white beans}}{\text{total beans}} \times 100\%$</i>	Number of beans remaining
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

**Data collection for renew-a-bean –
Part 2: Increasing use in the number of beans used each year**

Year	Total beans removed	Number brown beans	Number white beans	Percent of beans that are renewable	Number of beans remaining
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					