

Powering Smallsburg Activity – Powering Smallsburg Worksheet **Example**

Instructions

The village of Smallsburg needs power. Smallsburg has a mall, a school, a sports stadium, and a hospital. Table 1 shows how much power each one needs.

Community Facility	Power Required (in MW, mega watts)
Mall	20
School	1
Stadium	10
Hospital	15
Offices/businesses	4

Table 1

Now that you know about the community of Smallsburg, complete the following questions.

Questions

- Based on Table 1, how much total power (MW) does the Smallsburg power plant have to supply? **50 MW**

You can pick combinations of the power plants in Table 2 to add up to the total power needed in Question 1. Each power plant costs money, and some power plants give off emissions (pollution) and some do not.

You have a **total of \$250** million dollars to spend.

Power Plant Type	Power Provided (MW)	Cost (million \$)	Emissions Per/Year
Hydroelectric	10	40	None
	25	100	None
Photovoltaic	5	50	None
	25	250	None
Wind turbines	10	60	None
	25	150	None

Power Plant Type	Power Provided (MW)	Cost (million \$)	Emissions Per/Year
Nuclear	10	40	1 ton radioactive waste
	25	100	2.5 ton radioactive waste
Coal	10	20	80,000 ton CO ₂ , 200 ton SO ₂ , 6 pounds mercury
	25	50	200,000 ton CO ₂ , 500 ton SO ₂ , 15 pounds mercury
Advanced Coal	10	50	80,000 ton CO ₂ , 20 ton SO ₂ , 0.6 pounds mercury
	25	125	200,000 ton CO ₂ , 50 ton SO ₂ , 1.5 pounds mercury

Table 2

2. Fill in the table below with your power plant choices to power the necessary services listed in Table 1. (Note: You do not have to use all of the rows below.)

Power Plant Type	Power Provided (MW)	Cost (million \$)	Emissions Per/Year
Coal	25	50	200,000 tons CO₂, 500 tons SO₂, and 15 pounds
Nuclear	25	100	2.5 tons of radioactive waste

3. What is the total energy (power) production of your power plants? **50 MW**
(Note: add up column 2)
4. What is the total cost of your power plants? **\$150** million dollars
(Note: add up column 3)

5. Do your power plants give off emissions (pollution)? _____

What might that pollution do to the community?

The CO₂ (carbon dioxide) contributes to global warming. We are not sure about all the negative impacts of global warming, but increased number and severity of hurricanes is one example of a negative impact. Sulfur dioxide contributes to acid rain, and mercury causes birth defects. The radioactive waste needs to be stored somewhere safe for a long time. Otherwise, it causes cancers and other illnesses in people.

6. How much money do you have left, after buying the power plants?

\$100 million dollars

7. If you did not spend all the \$250 million on power plants, what will you buy with the money left over (see Table 3)?

\$50 million is going to universities to research how to prevent emissions from coal power plants and the other \$50 million is going to construct a safe place for the nuclear waste.

Improvement	Cost (million \$)
Repair streets and sidewalks	20
Fund universities to research cleaner energy technologies	30
Double the number of teachers in all the schools	20
Make food free for the community	100
Nobody works on Fridays	40
Build large central park	20
Help fund a free medical clinic	10
Give money back to taxpayers	Remainder

Table 3