



## Lab 4: Analysis of Energy Sources

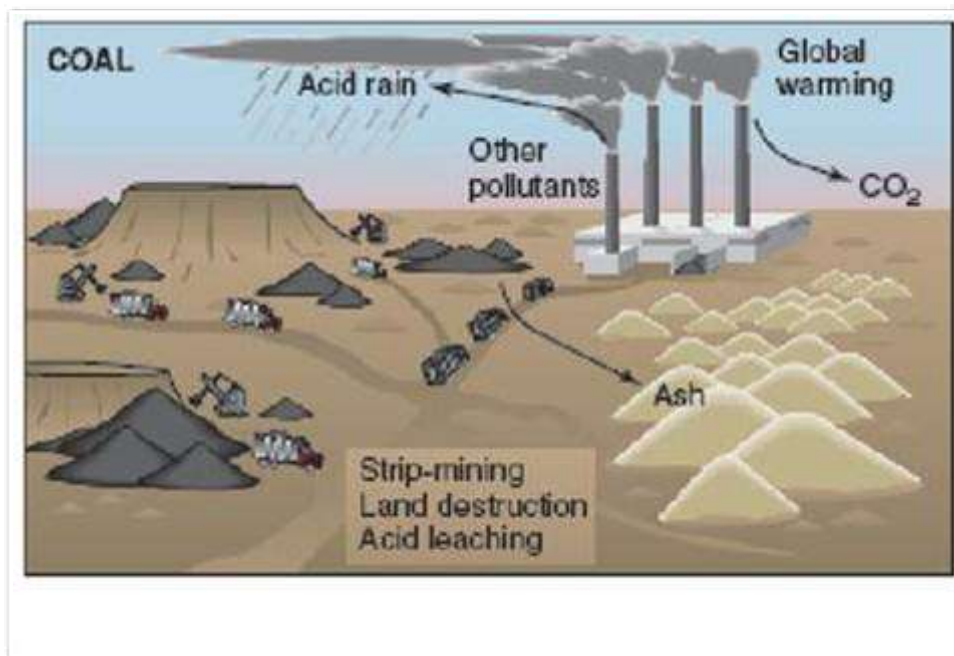
### - Read It

#### Introduction

There are many perceived concerns with using nuclear energy as a primary energy source to generate electricity. Possibly, when you think of nuclear energy, one of the main thoughts that might pop into your heads is unstoppable destruction. If you link that thought along with the high costs of building nuclear power plants and the difficulties in radiation waste management, the hesitation about using nuclear energy as a resource for electricity production is understandable. However, with no definitive reliable and renewable energy sources being used in the world, what are your choices when you consider the needs for human sustainability? Fossil fuels, despite their description as being nonrenewable and an important source of pollution, still provide the world with about two thirds of its electricity, with the fossil fuel coal making up the greatest contribution.

Below you will see two graphic that represent the addition of coal or uranium that is mined as a fuel source for either a coal-fired or nuclear power plant, respectively. A data table will be displayed below each graphic to quantify pollutants associated with coal-fired and nuclear power plants. Use this information to complete your lab worksheet and help you accept or reject your hypothesis.

#### Coal Plant

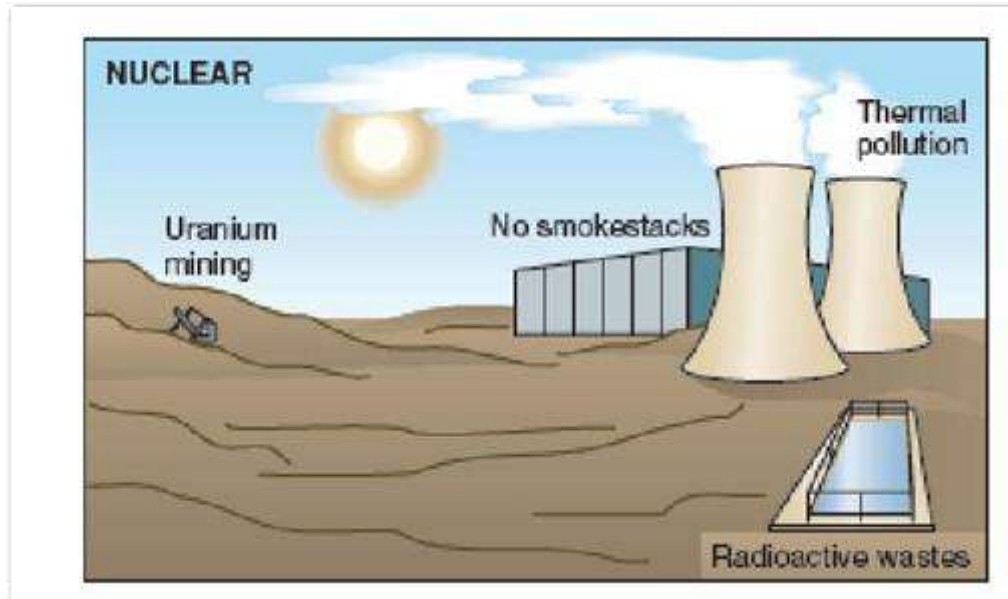


#### Coal Plant Pollutants

Time Line Points	Fuel (Coal) Needed (tons)	CO <sub>2</sub> Emissions (tons)	Sulfur Dioxide and Other Emissions (tons)	Radioactivity mSv	Solid Waste (tons)	Accidents
Qtr 1	625,000	1.75 mil	75,000	0.25 mSv	150,000	
Qtr 2	1.25 mil	3.5 mil	150,000	0.5 mSv	300,000	Health impairments
Qtr 3	1.875 mil	5.25 mil	225,000	0.75 mSv	450,000	Worker fatalities
Qtr 4	2.5 mil	7 mil	300,000	1 mSv	600,000	Fire destruction

**Note on Radioactivity:** A coal plant releases 100 times more radioactivity than a nuclear power plant because of the natural presence of radioactive compounds (uranium, thorium) in the coal. *Millisievert* (mSv) is a high-level radiation unit, and 1 mSv = 1/1,000 of a sievert. This is used to express the level of radiation exposure, which indicated an individual's increased risk of developing cancer.

### Nuclear Plant



### Nuclear Plant Pollutants

Time Line Points	Fuel (Coal) / Uranium Needed (tons)	CO <sub>2</sub> Emissions (tons)	Sulfur Dioxide and Other Emissions (tons)	Radioactivity mSv	Solid Waste (tons)	Accidents
Qtr 1	18,750 / 7.5	52,500	0	0.0025 mSv	62.5	
Qtr 2	37,500 / 15	105,000	0	0.005 mSv	125	
Qtr 3	56,250 / 22.5	157,500	0	0.0075 mSv	187.5	Minor emissions
Qtr 4	75,000 / 30	210,000	0	0.01 mSv	250	Catastrophic releases leading to radiation sickness, death, and environmental contamination

**Note on Radioactivity:** A coal plant releases 100 times more radioactivity than a nuclear power plant because of the natural presence of radioactive compounds (uranium, thorium) in the coal. *Millisievert* (mSv) is a high-level radiation unit, and 1 mSv = 1/1,000 of a sievert. This is used to express the level of radiation exposure, which indicated an individual's increased risk of developing cancer.

### Reference

Nebel, B.J., & Wright, R. T. (2008). *Environmental science: Toward a sustainable future*. (9th ed.). Upper Saddle River, NJ: Prentice Hall.

### End of Activity

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