**Guided Notes: Alternative Energy Solutions**

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (LCOE) is used to compare costs and benefits of different energy resources.

**Key Concepts:**

• Two main categories of costs for power-generating systems are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ costs and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ costs.

• Capital costs tend to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for renewable energy systems compared to fossil fuel plants.

• Operating costs are generally \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for fossil fuel plants due to fuel costs.

• LCOE calculation:

LCOE = (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ costs + yearly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ costs x # of years) / (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy production)

• LCOE does not include costs of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ renewable energy into the power grid.

• Challenges for renewable energy include \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of generation.

• Costs of renewable energy are expected to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the future, while fossil fuel costs are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or falling more slowly.

• Benefits of renewables not factored into LCOE: produce little to no \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ gases, can be collected in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ areas, require less \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Real World Examples:**

1. Electric vehicles (EVs) vs. gas-powered cars: When deciding whether to buy an electric car or a traditional gas-powered car, you can use a similar cost-benefit analysis to \_\_\_\_\_. The EV might have a higher upfront cost (like capital costs), but lower operating costs (no gas, less maintenance). Over time, the total cost of ownership might be lower for the EV, similar to how some renewable energy sources become more cost-effective in the long run.

2. School cafeteria energy efficiency: Your school cafeteria could compare the cost-effectiveness of different appliances, like ovens or refrigerators, using a method similar to LCOE. They might consider the initial purchase price, expected lifespan, and estimated energy usage to determine which appliance would be most cost-effective over time. This could help the school save money and reduce its environmental impact, just like choosing the most efficient \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ on a larger scale.

**Word Bank:**

Levelized Cost of Energy

capital

operating

higher

higher

capital

operating

total

delivering

location

variability

decrease

stable/increasing

greenhouse

urban

water

LCOE

energy sources