**Informative Speech, Electricity and Capacity Markets**



**Introduction**

1. Welcome to this speech on electricity and power plants. Imagine you are an ancient Egyptian, and the Pyramid power plant has just been finished to provide electricity to your house on the Nile. How do you celebrate?
2. In this speech, we will discuss how electricity is produced at power plants and distributed to our homes and businesses, and how power plants finance power plant additions to produce electricity, called capacity markets.
3. Electricity powers our homes, businesses, and even cars now. Power plants produce electricity through using various forms of energy as inputs, including natural gas, nuclear power, and renewable energy sources such as wind, solar, and hydro.

**Ancient Electricity**

1. Our first topic is Ancient Electricity. We all know the story in the U.S. about Benjamin Franklin proving that lightning contained electricity, though older cultures around the world have also experimented with electricity in various forms.
2. Electricity is an aspect of our everyday life that has been around since ancient times.
3. For example, according to the Smith College Museum in 2024, the Baghdad Battery, around 2000 years old, was found in Iraq that contained a cylinder of copper and an iron rod suspended in the center.
4. Replicas of the battery were made that could produce a charge of about one volt when used with vinegar or lemon.
5. The Baghdad Batteries may have been used to electroplate items, such as putting a layer of one metal (gold) onto the surface of another (silver), a method still practiced in Iraq today.
6. Bret’s Electric (2023) describes how the ancient Egyptians recorded electric shocks from fish, and the ancient Greeks recorded experiments in static electricity.
7. Some people have even argued that the Egyptian pyramids were giant power plants designed to harvest electricity from the Nile River.

**Ohm’s Law**

1. Next, we will discuss Ohm’s Law, which considers the relationship between voltage, current, and resistance.
2. Although many ancient civilizations discovered forms of electricity, they all did not have a firm understanding of Ohm’s Law.
3. One facet of electricity that impacts our understanding of the phenomenon is that you cannot see electricity.
4. True, you can see lightning, but lightning is actually a reaction in the air to the energy passing through it, and not the energy exchange happening from the clouds to the earth itself.
5. *Study.com in 2024 describes the relationships between current, voltage, and resistance.*
6. Current: The amount of charge that flows through a conductor in a given time interval, or the rate at which charge is flowing. Measured in Amps.
7. Voltage: The potential difference between two points, measured across a wire or component, or the difference in charge between two points. Measured in Volts.
8. Resistance: The opposition to current in a circuit, or a material's tendency to resist the flow of charge (current). Measured in Ohms.
9. These values, current, voltage, and resistance, describe the movement of charge, and thus, the behavior of electrons.
10. To study these values, we use circuits, which are closed loops that allow charge to move from one place to another.
11. Components in the circuit allow us to control this charge and use it to do work Spark Fun Learn (2024).
12. Ohm's Law states that the current flowing through a circuit is directly proportional to the voltage applied, and inversely proportional to the resistance of the circuit.
13. This relationship is expressed mathematically as V = I \* R, where V is voltage, I is current, and R is resistance.
14. One method for calculating these electricity values is to use linear algebra to construct a matrix and solve for the unknowns.
15. Isaac Physics (2024) describes Kirchhoff’s Laws, which describe rules for current and voltage in a circuit.
16. Kirchhoff's current law (1st Law) states that the current flowing into a node (or a junction) must be equal to the current flowing out of it. This is a consequence of charge conservation.
17. Kirchhoff's voltage law (2nd Law) states that in any complete loop within a circuit, the sum of all voltages across components which supply electrical energy (such as cells or generators) must equal the sum of all voltages across the other components in the same loop. This law is a consequence of both charge conservation and the conservation of energy.

**Capacity Markets**

1. Our third topic today is how power plants are funded. Power plants make money from energy markets, selling electricity in the present, and capacity markets, selling reserves to produce electricity in the future.
2. Capacity markets are a reserve market construct used in electricity markets to provide revenue to plant operators in response to price caps and plant additions.
3. Capacity markets became more widespread after deregulation of electricity markets in the 1990s; some regions use capacity markets to generate income and some do not.
4. Also, the emergence of renewable energy sources which have zero marginal cost, that is, they don’t require fuel, have pushed down electricity costs and remuneration for plant operators, thus opening the argument that capacity markets are needed because of the increased emergence of renewable energy sources and deregulation, which cut rates.
5. Capacity Markets for providing remuneration to power plants is relevant because they directly impact our electricity bills, and the argument is that capacity markets for electricity remuneration result in overall lower electricity bills for customers.
6. Capacity markets help ensure that there is enough electricity to meet future demand and provide long-term stability to the power system by allowing investment for infrastructure (NRG Editorial Voices, 2023).

**Conclusion**

1. Without electricity, our modern society would cease to function as we know it. Electricity powers the air conditioners in our homes and lights in our businesses, and also even powers up automobiles now.
2. I want to pose a question to the audience about electricity. How would you light your house without electricity? Would you use candles? Would you use a kerosene lamp? Or would you wake up earlier when the sun rises and go to sleep when the sun sets in the evening.
3. These are questions that people had to face before electricity became commonplace in our homes and businesses. The power plants that produce electricity keep us up and running in our lives.

**References**

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