# Self Test
# Computing Energy Costs and Supply

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**Click on True or False to test your knowledge of the chapter.**

**1.** **True** **False**. The largest portion of the world energy is produced from hydro power.

**2.** **True** **False**. Non-associated gas differs from associated gas, which is dissolved in oil.

**3.** **True** **False**. The largest portion of the world's electricity is hydro power.

**4.** **True** **False**. The CIS has the greatest uranium reserves.

**5.** **True** **False**. CAMECO is the largest uranium producer.

**6.** **True** **False**. In situ leaching requires massive movement of overburden and results in a large amount of tailings.

**7.** **True** **False**. Uranium enrichment is strictly prohibited in the U.S.

**8.** **True** **False**. Uranium enrichment is a critical step in transforming natural uranium into nuclear fuel to produce energy and requires increasing the concentration of U-235 to fissionable levels

**9.** **True** **False**. After being mined, uranium is directly used as fuel for nuclear plants.

**10.** **True** **False**. While production is concentrated in a handful of companies worldwide, uranium conversion and uranium enrichment is done by multiple small companies all over the world.

**11.** **True** **False**. Spent fuel can be reprocessed after leaving the nuclear reactor.

**12.** **True** **False**. There is no difference between mixed oxide fuel (MOX) and basic nuclear fuel.

**13.** **True** **False**. Canada is the largest producer of hydroelectricity followed by the US.

**14.** **True** **False**. Hoover dam, in the US, has the largest hydro capacity in the world.

**15.** **True** **False**. The amount of electricity produced by hydro is only influenced by the amount of water flow entering the turbine.

**16.** **True** **False**. Hydroelectric power produces 'clean' electricity with no environmental impacts.

**17.** **True** **False.** Another advantage of hydroelectric power is that it is a constant and reliable source of electricity.

**18.** **True** **False.** A 400 Kw wind turbine costs $300,000 plus $100,000 of installation costs all due at the completion of installation. Assume that 1. winds allow the turbine to turn at full capacity 25% of the time for 20 years with no down time for repairs, 2. production stops at the beginning of year 21, and 3. the discount rate is 10%. Then the levelized capital cost per kwh is $0.048.

**19. True False.** Take the example in exercise 18, a 400 Kw wind turbine costs $300,000 plus $100,000 of installation costs all due at the completion of installation. Again assume that 1. winds allow the turbine to turn at full capacity 25% of the time for 20 years with no down time for repairs, 2. production stops at the beginning of year 21, and 3. the discount rate is 10%. If the interest rate doubles the cost per kwh will be cut by half.

**20. True False.** Take the example in exercise 18, a 400 Kw wind turbine costs $300,000 plus $100,000 of installation costs all due at the completion of installation. Assume that 1. winds allow the turbine to turn at full capacity 25% of the time for 20 years with no down time for repairs, 2. production stops at the beginning of year 21, and 3. the discount rate is 10%. If a new technology allows generators to double their productive life, ceteris paribus, your capital cost per hour will decrease by about 12%.

**21. True False.** The probability distribution of possible wind speeds in the region are:

| x | P(x) |
|---|---|
| 30 mph | 5% |
| 10 mph | 45% |
| 0 mph | 50% |

(Assume that electricity production El is a function of wind speed (El = g(x) = 30x, x= wind speed)). Then the expected amount of power generated is 1,576,800 kwh each year.

**22. True False.** Now combine the information in the above problems. You have bought a 400 Kw wind turbine costing $300,000 plus $100,000 of installation costs. It takes only hours to install and power production then commences immediately if the wind is blowing. You can assume that power is paid for at the end of each year. 1. production stops at the beginning of year 21, 2. the discount rate is 10%, and 3. the probability distribution of possible wind speeds in the region are:

| x | P(x) |
|---|---|
| 30 mph | 5% |
| 10 mph | 45% |
| 0 mph | 50% |

and 4. electricity production is a function of wind speed (El = g(x) = 30x, x= wind speed)). Then the cost per kwh is $0.048.

**23. True False** A solar cooker is expensive to build because of the advanced technology needed.

**24. True False.** Photovoltaics are made from two layers of silicon material, or other conductor that have added impurities.

**25. True False.** The disadvantages of photovoltaics are their costs, intermittent, requiring storage or alternative power sources, and diffuse.

**26. True False.** The advantages of solar power are that it is widely spread, matches energy use patterns, and that the costs are comparatively inexpensive relative to other methods of electricity generation like oil, gas, coal and nuclear.

**27. True False.** Geothermal energy is produced only in the form of hot water from the depth of the earth and is used solely for heating purposes.

**28. True False.** For above ground costs, the discounted present value of total future costs equals the initial capital costs for development.

**29. True False**. Suppose you have found a new field in the Pletmos Basin, offshore South Africa. Its decline rate is $\alpha = 0.15$, the discount rate is 0.12, the field cost $2.3 billion to find and develop, and reserves are 380 million barrels. Your in ground cost is $10.89.

**30. True False**. If a pipeline company has an initial cost of $ 325 million with a 12 % discount rate, it takes $ 1.2 per barrel to transport 450 million barrels of oil for 15 years.

**31. True False.** The Hubbert Curve implies that oil and gas production will continuously decline over time.

**32. True False** Power storage is not a problem with solar power as it is a constant, steady power supply.

**33. True False** Whether the energy source is coal, oil, gas, geothermal, wind, solar thermal, biomass, hydropower, or nuclear making electricity starts with turning a generator shaft.