



Renewable Energy Professional (REP) Study Guide and Sample Questions

The REP Certification exam is a four-hour open book exam. The exam questions are based on the topics listed below, as a result of diversity of background and experience of Renewable Energy professionals. You may bring a hand-held calculator to the exam as the REP exam does not allow computers, tablets, or cell phones to be used during the test.

It is highly recommended that you review the complete Study Guide and answer the Exam Review questions included in this document to determine your readiness for the exam.

- Renewable Energy Basics
- Solar Energy
- Wind Energy
- Bio-mass
- Waste Conversion
- Ocean Thermal Energy
- Installation
- Approval Process

Study Guide Topics and References

- **Introduction to Alternative Energy**
- **Environmental Impacts - a Driver for Using Alternative Energy**
- **Alternative Energy and Carbon Reduction**
- **Solar Energy**
 - Hot water heating (domestic hot water and pool heating)
 - Solar heating and air conditioning
 - Solar electric generation
 - Case studies
- **Wind Energy**
 - Design considerations such as intermittency and penetration limits
 - Small scale wind turbine generation (WTG) systems
 - Onshore wind energy technologies
 - Offshore wind farms
 - Economics and feasibility
 - Case studies of wind power projects
- **Hydropower**
 - Large hydro systems
 - Mini-turbine technologies
 - Ocean generation systems

- River and stream current generation
- Case examples
- **Geothermal Energy**
 - Types of geothermal energy resources and development approaches
 - Electrical generation
 - Earth tubes applications for low temperature heating and dehumidification
 - Geothermal heat pump applications
 - Case examples
- **Waste-to-Energy Systems**
 - Wastes as an energy source
 - Differences between thermal and non-thermal technologies
 - Biological mechanical treatment (BMT)
 - Biomass energy
 - Waste fuels and their uses
 - Landfill gas and gas turbines
 - Plasma-arc gasification processes (PGP)
 - Case studies of waste-to-energy plants
- **Fuel Cells - An Example of Hydrogen Applications**
 - How fuel cells work
 - Fuel cell designs (proton exchange, oxygen-ion, proton-membrane)
 - Differences between low, intermediate and high temperature systems
 - Applications of fuel cell technologies
- **Hybrid Alternative Energy Systems**
 - Combining alternative energy components
 - Uses for hybrid energy systems
 - Solar and wind power combinations
 - Pumped-storage, wind generated hydroelectricity
 - Applications for hybrid systems
- **Creative Energy Storage Applications**
- **Alternative Energy Strategies for Buildings**
 - Using alternative energy for green construction
 - Site solutions to optimize alternative energy potential
 - LEED and Energy Star buildings
 - Integrating multiple alternative energy technologies in buildings
 - Demand-side conservation approaches
 - Net zero energy and net-positive energy construction
 - Carbon neutral construction
 - Case studies
- **Transportation Systems**
- **Governmental Alternative Energy Programs**
- **Financial Approaches and Incentives for Alternative Energy**
- **The Future of Alternative Energy**

Exam Review Questions

1. Which of the following has been suggested as an approach to sequestering carbon?
 - A. Technological sequestration
 - B. Ocean direct injection
 - C. Geological storage
 - D. All of the above
 - E. None of the above

2. Hydroelectric is scalable. Which of the following is not a primary component of such systems?
 - A. Dam or retention
 - B. Tail tube extractors
 - C. Intakes
 - D. Electrical generation system
 - E. Penstock

3. Which of the following lists the actual/correct greenhouse gases that cause global climate change and are typically included in regulatory schemes?
 - A. Carbon Dioxide, Methane, Nitrous Oxide, Sulfur Hexafluoride, HFCs, PFCs
 - B. Carbon Dioxide, Hydrogen Sulfide, Ammonia
 - C. Carbon Monoxide, Hydrogen, Helium, Nitrogen
 - D. Lead, Asbestos, Radiation, Inert Gases
 - E. Carbon Dioxide, Methane, Nitrous Oxide, Sulfur Hexafluoride, HFCs,

4. A 100 KW Solar Electric installation costs \$500,000. The Investment Tax Credit is 30%. The energy produced by the system is \$20,000 per year. The Simple Payback is 5 years. What is the annual fixed value of the Renewable Energy Credits?
 - A. \$30,000
 - B. \$50,000
 - C. \$75,000
 - D. \$20,000
 - E. None of the above

5. Which of the following is not considered to be a hybrid electrical generation system?
 - A. Solar PV system coupled with a WTG
 - B. Passive solar heating with rooftop PV and biomass cogeneration
 - C. Wind generator with acid batteries
 - D. Geothermal HPs with micro-hydropower
 - E. Actually all are hybrid generation systems

6. The output of a wind turbine system in the Northern Hemisphere is typically highest in which season:
 - A. Spring
 - B. Winter
 - C. Summer
 - D. Fall
 - E. Impossible to differentiate

7. You are a carbon auditor and have limited funding to do a complete audit. You can only audit a portion of the three types of emissions. Which are the most important (usually required) for you to focus on during the audit?
- A. Scope III emissions, because they encompass the factors from Scopes I and II
 - B. Scope II and Scope III emissions, because Scope I emissions can be estimated if you have the other data
 - C. Scope I and direct emissions
 - D. Scope I and Scope II emissions
 - E. Scope I and Scope III emissions (consistent with WRI/WBCSD Protocols)
8. A vertical, ground source system will generally require a well, 250 feet (76.2 m) to 300 feet (91.4 m) deep, for each:
- A. 20 tons (253.2 MJ) of cooling required
 - B. 15 tons (189.9 MJ) of cooling required
 - C. 10 tons (126.6 MJ) of cooling required
 - D. 5 tons (63.3 MJ) of cooling required
 - E. 1 ton (12.6 MJ) of cooling required
9. Optimum tilt of solar panels for each geographic region can be estimated by:
- A. Array height
 - B. Longitude
 - C. Distance from azimuth
 - D. Latitude
 - E. Type of mounting
10. The variables required to calculate the recurring payment amounts of a loan include all except:
- A. Interest rate
 - B. Principle amount
 - C. Number of payments
 - D. Present value of the loan
 - E. All of the above

Answers: 1(D), 2(B), 3(A), 4(B), 5(C), 6(B), 7(B), 8(E), 9(D), 10(D)

Recommended Reference Books

- [Alternate Energy: Assessment & Implementation Reference Book](#)
- [Alternative Fuels: The Future of Hydrogen, 3rd Edition](#)
- [Hydrogen & Fuel Cells: Advances in Transportation and Power](#)
- [Megatrends for Energy Efficiency & Renewable Energy](#)