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RENEWABLE ENERGY PROFESSIONAL

REP OVERVIEW

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MODULE

5

Energy Conservation and Efficiency

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RENEWABLE ENERGY PROFESSIONAL OVERVIEW

Energy conservation and efficiency are crucial concepts for the sustainability of renewable energy systems. As global demand for energy continues to grow, it is essential to utilize energy resources judiciously. Strategies for maximizing energy conservation and efficiency must accompany the integration of renewable energy sources into existing energy systems, providing sustainable alternatives to fossil fuels.

Learning Objectives

- Introduction
- Environmental Impacts
- Alternative Energy and Carbon Reduction
- The Future of Alternative Energy
- Energy Conservation and Efficiency
- Alternative Energy Strategies for Buildings
- Professional certification in Renewable Energy
- Summary and Resources
- REP Practice Test: Test Your Knowledge!



INTRODUCTION

- Involves reducing energy consumption through behavioral changes, technological advancements, and systemic shifts.
- Focuses on reducing reliance on non-renewable energy sources.
- Measures include using energy-efficient LED lighting, unplugging devices when not in use, and optimizing heating and cooling.
- Defined as the ratio of the useful output of services to the energy input.
- Improving energy efficiency involves using less energy to provide the same level of service.
- Interplay between conservation and efficiency is often interrelated.
- Barriers to Energy Conservation and Efficiency:
 - Economic factors, behavioral resistance, policy and regulatory frameworks, and technological limitations.
- Effective strategies can help manage energy resources, reduce dependence on fossil fuels, and mitigate climate change impacts.

ENERGY EFFICIENCY AND RENEWABLE ENERGY: TWIN PILLARS OF SUSTAINABLE ENERGY POLICY



- Energy efficiency and renewable energy are the two pillars of sustainable energy policy.
- Energy conservation and efficiency are low-hanging fruit for increasing energy supply.
- A 2017 study estimated potential energy savings for the US from increased conservation and efficiency to be around 741TWh from 2016 to 2035.
- Energy conservation and efficiency can reduce environmental consequences, prolong equipment life, and help reduce global competition for nonrenewable energy sources.
- Attitudes and approaches towards conservation and efficiency approaches vary from apolitical to increasingly political.
- Many people find both approaches meritorious, but some are simplistic.
- Emphasizing one position over the other, including both economically quantifiable and intangible costs and benefits, is common.

VIEWS OF THOSE PLACING THE PRIMARY STRESS ON CONSERVATION AND EFFICIENCY

Conservation Emphasizer

Use less energy

Emphasize human behavior

Educate public on the environment

Slow economic growth if needed

Ban wasteful practices and products

It is the Third World's turn now

Technology is the enemy

Efficiency Emphasizer

Use energy more efficiently

Emphasize technology

Educate public on costs and benefits

No need to slow growth

Market will choose best products

Keep American advantages

Technology is the savior



RENEWABLE ENERGY ENERGY MANAGEMENT

- Energy management is crucial for optimizing the use of renewable energy sources like solar, wind, hydro, biomass, and geothermal energy.
- Key goals include efficiency improvement, reliability and stability, cost optimization, and environmental compliance.
- Energy management systems (EMS) help predict energy availability and adjust consumption patterns.
- Demand response (DR) programs incentivize consumers to reduce or shift energy usage during peak demand periods.
- Energy storage solutions (ESS) capture and store excess energy produced during peak generation periods for later use.
- Smart grids utilize digital communication technologies to monitor and manage energy flows.
- Policy and regulatory frameworks heavily influence energy management in renewable energy.
- Incentives such as feed-in tariffs, tax credits, and renewable energy certificates (RECs) significantly impact the economic viability of renewable energy projects.



OBSTACLES TO ENERGY EFFICIENCY & CONSERVATION

- Pressures of safety, comfort, and convenience may overpower efficiency, especially when energy costs are low.
- Conservation involves many small partial solutions and different decision-makers, making it more complex to solve.
- Lack of action on conservation may be due to inertia, especially in the face of confusing information.
- Belief systems and the presentation of the issue can limit the appeal of conservation to skeptics.
- The upfront cost of conservation efforts can be a significant barrier, with many people and companies insisting on a short payback time.
- Poorly aligned incentives can lead to the person paying the upfront cost not reaping the benefits.
- Insufficient or misguided government policies, such as the "cash for clunkers" policy in the US, can also hinder conservation efforts.
- The bans on electric bicycles in major US cities are likely on safety-related grounds, which is ironic as they are likely safer than unbanned normal bikes.





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THANK YOU

