

Energy Saving in Electrical Lighting: Challenges, Solutions, and the Role of Renewable Resources

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Annotatsiya: Yoritishda energiya samaradorligi bugungi kunda eng dolzarb masalalardan biridir. Energiya resurslariga bo'lgan talab ortib borishi va ularga bo'lgan ehtiyoj oshishi bilan, energiya resurslaridan oqilona foydalanish zarurati yanada muhim ahamiyat kasb etmoqda. Shuningdek, elektr jihozlari sonining ortib borishi, yoritilgan bilbordlar va boshqa katta miqdorda elektr energiyasini talab qiladigan tuzilmalar sonining ko'payishi bilan, elektr energiyasi iste'moli oshmoqda. Elektr energiyasi iste'molining oshishi atrof-muhitga qo'shimcha yuk soladi, tabiiy resurslarni kamaytiradi va ekologik muammolarni keltirib chiqaradi. Atrof-muhitning yuklanishi ortib bormoqda. Bunga qaramay, energiya va yoritish xarajatlarini tejash va qayta ishlash chora-tadbirlarini ishlab chiqish va amalga oshirishga yetarlicha e'tibor qaratilmayapti. Elektr energiyasini tejash orqali bir nechta samarali natijalarga erishish mumkin. Yuqorida aytib o'tilgan resurslar orqali olingan energiya keyinchalik elektr energiyasiga aylantiriladi, bu esa tabiiy resurslarni qisman tejashga olib keladi.

Kalit so'zlari: energiya tejash, energiya samaradorligi, elektr energiyasi iste'moli, aqlli yoritish yechimlari, energiya tejamkor texnologiyalar.

In today's world, the issue of electricity energy saving has become a matter of great importance across all sectors. In both developed and developing countries around the world, energy saving in lighting devices holds significant importance.

The following questions are considered in relation to this issue:

1. What is electrical energy?
2. How can energy-saving measures be implemented?

To answer the question of what electrical energy is, we recall its origins. Electrical energy, derived from the Latin word "electricus," is the set of phenomena arising from the mutual interaction and ordered movement of charged free electron particles. Energy is a general term for the ability to perform work, such as changes in light, heat, and motion. Energy exists in various forms, including mechanical, light, chemical, and electrical. Using energy for tasks such as burning fuel for heat production, fueling vehicles with gasoline, or driving turbines to generate electricity are all methods of utilizing energy.

Currently, electrical energy serves as a fundamental base for almost all human activities. Electrical energy has numerous advantages, including its use in heating, factories, transportation, building operations, and much more.

In many countries, only 40% of the energy used is derived from electricity. The remaining 60% of energy is largely supplied by directly extracted fuels, such as gasoline for powering vehicles or natural gas for heating and cooking. Many countries have committed to supplying carbon-free electricity by 2050. To meet climate goals, it is essential to address the remaining 60% of energy that is not yet provided by electricity. One way to achieve this is through a process known as

electrification, where technologies using extracted fuels are replaced by those powered by electricity. For example, switching to electric or induction cookers or managing electric vehicles. Supplying more electricity from clean sources and electrifying existing technologies could lead the world to a carbon-free future.

In simple terms, energy saving in our daily lives starts with households. The largest portion of energy costs goes toward household usage. In homes, electricity powers lights, irons, computers, refrigerators, and other appliances. Every year, the number of electrical devices increases, as well as the number of illuminated billboards and other structures requiring significant amounts of electricity. This invisible worker is used everywhere. The increase in electricity consumption adds to the environmental burden, depletes natural resources, and raises ecological concerns, threatening an "energy hunger."

Moreover, one of the most important resources for saving energy is the rationalization of energy consumption in lighting devices. The use of electricity spans various sectors, including public buildings, industrial enterprises, construction and transportation, agriculture, street lighting, and even television.

Irrational use of electricity consumes coal, gas, oil, and water, whose reserves are not infinite, and the release of harmful substances into the atmosphere is enormous. Today, large cities are choking on smoke. The burning of fuel and the reduction of forests on the Earth's surface increase the concentration of "greenhouse gases" in the atmosphere, disturbing the natural balance and leading to warming and global climate change. At the same time, the future of human civilization largely depends on solving this issue, which involves not only the gradual depletion of fossil fuels used for electricity generation but also the rapid pollution of the environment due to harmful emissions from energy production, including carbon dioxide and sulfur, as well as mercury.

Energy-saving requirements are linked to the use of renewable resources for energy production, which results in fewer emissions compared to burning fossil fuels. Transitioning from fossil fuels to renewable energy sources is crucial in the fight against climate crisis, as renewable energy now accounts for a major portion of emissions.

Today, renewable energy serves as a cheaper alternative in many countries, creating three times as many jobs as fossil fuels. For example, solar energy is the richest of all energy resources and can even be used on cloudy days. The rate at which solar energy is captured by Earth is approximately 10,000 times greater than the rate at which humanity consumes energy.

Solar technologies can provide cooling, heating, electricity, natural light, and fuel. These technologies allow solar radiation to be converted into electricity using photovoltaic panels or non-metals.

In the past decade, the cost of producing solar panels has dropped dramatically, making them not only affordable but often the cheapest way to generate electricity. Solar panels last for about 30 years and come in various types depending on the materials used. Solar energy has become widely used today, significantly contributing to energy savings.

Wind energy also offers several advantages. Large wind turbines on land (land-based wind farms) or at sea (offshore wind stations) capture the kinetic energy of moving air. Although wind speeds vary depending on location, strong winds occur in many regions of the world. Offshore wind energy holds tremendous potential.

Geothermal energy harnesses heat from the Earth's interior. Heat is extracted from geothermal reservoirs through drilling or other methods. Fluids with various temperatures appearing on the Earth's surface can be used to generate electricity. The technology for generating electricity from hydrothermal reservoirs has been mature and reliable for over 100 years.

Hydropower uses the energy of water moving from higher altitudes to lower ones. This energy can be harnessed using reservoirs and rivers. Hydroelectric plants (HEPs) use the energy of river currents. Hydroelectric power supply serves several beneficial purposes, including providing

drinking and irrigation water, helping combat floods and droughts, supporting navigation services, and ensuring energy supply.

Currently, hydropower is the largest renewable energy source in the power generation industry. The stability of the entire system depends on precipitation levels, which are influenced by climate change, and changes in ecosystems affecting these regimes. The necessary infrastructure for hydropower generation can also negatively impact ecosystems. As a result, many consider small HEPs a more ecologically friendly option, especially for people in remote areas.

Ocean energy utilizes the kinetic and heat energy of seawater, such as from waves or currents, to generate electricity or heat. Ocean energy systems are still in the early stages of development. Currently, several prototype devices that use waves and currents are being tested. Theoretically, ocean energy is expected to easily surpass humanity's current energy needs.

Bioenergy comes from various organic materials known as biomass, such as wood, coal, manure, and other organic fertilizers, as well as crops used to produce liquid biofuels. Biomass is largely used in rural areas for cooking, lighting, and heating, and the main consumers are the poor populations in developing countries.

In conclusion, electrical energy is a special form of energy used to power our homes and vehicles. Electrical energy is generated from solar, natural materials, light energy, chemicals, or mechanical energy from wind or water movement. Furthermore, one important resource for saving energy is the rationalization of energy consumption in lighting devices. Electrical energy is widely used in public buildings, industrial enterprises, agriculture, and street lighting. By saving electricity, several effective results can be achieved. The energy obtained from the above resources is then converted into electricity, which can also be transmitted through electrical transmission lines. This electrical energy is especially useful because it can be transmitted quickly and efficiently over long distances.