

What can you do with energy-efficient optics and photonics? Well, for starters...

OPTICS AND PHOTONICS PLAYS IN THE FUTURE OF RENEWABLE ENERGY, DISCOVERING AND COMMUNICATING BREAKTHROUGHS THAT WILL SHAPE THE FUTURE OF CLEAN, SUSTAINABLE, AND RENEWABLE ENERGY FOR GENERATIONS TO COME.

OPTICS AND PHOTONICS COVERS RESEARCH AREAS FOCUSED ON APPLICATIONS FOR RENEWABLE ENERGY HARVESTING, CONVERSION, STORAGE, DISTRIBUTION, MONITORING, CONSUMPTION, AND EFFICIENT USAGE.

DEVICES FOR MONITORING ENERGY USAGE, MONITORING EXHAUST GASES AND POLLUTANTS, ENERGY-EFFICIENT PRODUCTION PROCESSES, PRODUCTION OF RENEWABLE ENERGY DEVICES AND APPLICATIONS

GENERATION · CONCENTRATOR · PHOTON · GEOTHERMAL · BATTERY · GREEN ENERGY · WIND TURBINE · SLOW DEFORESTATION · HEAT · FUEL CELL · HYDROELECTRIC · TIDAL POWER · INDUSTRY · THERMODYNAMICS

FOOTPRINT · CLEAN ENERGY · WORK · SLOW CLIMATE CHANGE · CONSERVATION · DIRECT CURRENT · EFFICIENT · SUN · FLEXIBLE FUEL · ELECTRON · OFF-THE-GRID · THERMAL ENERGY · ENGINEER · ENVIRONMENT · FURNACE · SOLAR POWER · CURRENT

INNOVATIVE CONCEPTS FOR RENEWABLE ENERGY: LIGHT HARVESTING, LIGHT MANAGEMENT, ANTIREFLECTIVE MATERIALS, PLASMONIC STRUCTURES, PHOTONIC DEVICES FOR EFFICIENT HARVESTING AND CONVERSION OF SOLAR ENERGY

SOLAR PANEL · HUMAN-POWERED · SUSTAINABLE · TEMPERATURE · TURBINE · ALTERNATING CURRENT · UTILITIES · VOLT · WATT · ENTROPY · ABSORB · AC · ENERGY · ACCUMULATOR · BIOFUELS · ELECTRIC · CAPACITOR · SMALLER CARBON

KEVIN SCALE · KILOWATT · WIND POWER · STEAM TURBINE · KINETIC ENERGY · LIGHT · MAGNETIC ENERGY · MEGAWATT · HYBRID · OPTICS · PHOTONIC · STATIC ELECTRICITY · PUBLIC UTILITY · RADIANT

Drive a car fueled by the sun.

Charge your batteries with portable solar panels.

Get excited about making positive change with the Solar Decathlon.

Harvest energy from the ocean, using lasers to design and manage underwater turbine flow.

Beautify a city and save money with low-energy LED lights.

Use LEDs to reduce greenhouse gases.

Use a temporary tattoo (thinner than a human hair) that can draw power from miniature solar collectors to monitor your heart rate.

Utilize solar energy at night with nanostructured capacitors, and use the lights only when sensors detect motion.

Power the Mars Rover.

Use the abundant and free energy of the sun to power your world.

Use optical technology to passively collect natural light and direct it indoors.

Utilize sensors when drilling for geothermal power, for greater accuracy and economy.

Use solar concentrators to collect energy from multiple devices, creating a power plant.

Create a great costume with EL Wire.

Consider the promise of sustainable and safe fusion energy, from research with lasers at the National Ignition Facility.

Reduce air pollution and slow deforestation with solar cookers.

Harvest energy from vibrations in the dance floor, to activate lighting effects.

Find the best place to install floating wind farms, using NASA's QuikSCAT satellite maps.

What Exactly is Energy?

Energy is one of the most fundamental components of our universe and is define as “the ability to do work.” In the context of our infrastructure and daily lives, energy is used to move, lift, warm, and illuminate things. Most of this work, as much as 85% of it, is achieved with fossil fuels— coal, oil, and natural gas. However, increasing demands from a growing world population, depleting supplies, increasing costs, and by-products that are detrimental to the environment and human health, are giving us reasons to develop and commercialize alternative and renewable sources.

With the help of optics and photonics, multiple and creative solutions to these challenges are underway to meet the future. Both renewable and alternative sources are being explored and developed, along with ways to maximize efficiencies with current, more common energy sources and methods. Be part of the exciting world of new energy technologies.

Do you want to explore more?

For cool websites that involve optics and photonics visit:
spie.org/resources

Photos courtesy of: Stefano Paltera/U.S. Department of Energy Solar Decathlon (Solar Decathlon); NASA/JPL-Caltech (Mars Rover); Energy of the sun (SOHO is a project of international cooperation between ESA and NASA); Portable solar panels (Blue Pacific Solar); QuikSCAT satellite (NASA/JPL-Caltech); NIF Facility (Lawrence Livermore National Laboratory); Residential Skylight (Solatube International); Tattoo (UIUC / J. Rogers)