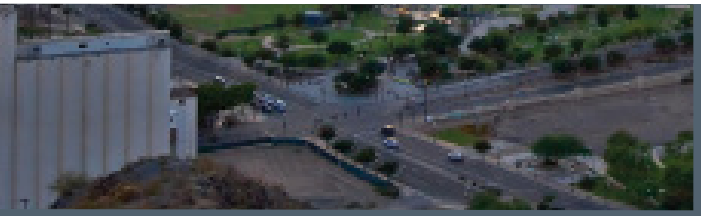
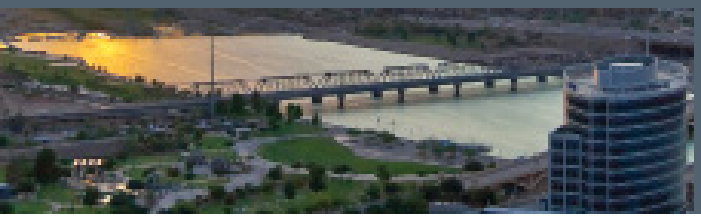


"The world's energy system is at a crossroads. Current global trends in energy supply and consumption are patently **unsustainable** — environmentally, economically, socially. But that can — and must — be altered; **there's still time to change the road we're on." ***

- World Energy Outloook, 2008

***But time is running out.**



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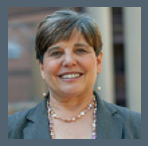

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LightWorks is an Arizona State University initiative that inspires and develops ways to revolutionize the use of energy and the large scale conversion of sunlight, carbon dioxide, and water into useful products. We support creation of new industries not just to power the world, but to empower it; not just to create wealth for a few, but to enrich people's lives everywhere; not just to light an energy revolution, but to enlighten communities across the globe; not just to achieve energy security, but to secure energy justice.
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Sustainable Fuels and Products

Sustainable Fuels and Products is a coordinated, interdisciplinary network of researchers within LightWorks that addresses high impact opportunities to enable and advance the production of sustainable fuels and products to meet society's grand sustainability challenges. LightWorks coordinates and develops strategic collaborations between our researchers and new potential partners.

Light-inspired solutions

Solar Fuels

Artificial Photosynthesis: The Center for Bio-Inspired Solar Fuel Production (BISfuel) develops artificial components that mimic and improve upon those used in natural photosynthesis, such as more broadly absorbing antennas, more robust reaction centers and catalysts for oxidizing water and producing hydrogen, and builds systems that combine these components to produce solar fuels. **solarfuel.clas.asu.edu**

Solar Thermochemical Fuels: Solar thermochemistry harnesses the sun's magnificent thermodynamic value in the form of heat to drive mechanical engines that produce electricity or chemical reactors that convert water and carbon dioxide back into a chemically reduced and usable form. Current research efforts at ASU focus on thermodynamics of the functional materials and systems analyses of solar hybrids and redox active metal oxide thermochemical cycles to store solar energy, to split water to make H_2, and to split CO_2 to make liquid hydrocarbon fuels.

Cross-Cutting Platforms

Light*Speed* Solutions communicates exciting innovations for technologies, business and policy on the roadmap to marketable and sustainable low-carbon transportation options. We are passionate about recycling waste CO_2 and redrawing boundaries for sustainable fuels and products. LightSpeed Solutions hosts the Future of Sustainable Transportation Fuels Forum, which includes a free four part webinar series and workshops to engage the range of future fuels stakeholders in conversations about the future of sustainable transportation fuel production and use. **www.lightspeedsolutions.org**

Life Cycle and Techno-Economic Assessment: ASU builds comprehensive models using operational data to assess the sustainability impact and economic viability of various emerging technologies such as algae biofuels, biopolymers, and other products, microbial electrochemical systems, solar thermochemical fuels and storage, concentrating solar technologies, and photovoltaics in order to inform about high-leverage research challenges

Microorganisms

Arizona Center for Algae Technology and Innovation (AzCATI) serves as a statewide and international hub for research and development on algae-based fuels and products. **Algae Testbed Public-Private Partnership (ATP^3)** is a network of open algae testbeds led by AzCATI with collaborating partners from national laboratories, academic, and industrial institutions. ATP^3 tests and evaluates algae systems and technologies in order to generate high-impact data for developing lifecycle and techno-economic assessment models. ATP^3 also offers a variety of relevant education and training opportunities. **www.azcati.com** and **www.atp3.org**

Photosynthetic Factories and Biomass to Energy: Photosynthetic microorganisms grow using sunlight, water, and CO_2. One research focus is to engineer these microbes to produce and excrete fuels and products of commercial value to facilitate low-energy harvesting and downstream processing. A second focus is on improving the performand of anaerobic digestion the converts biomass to methan gas. An exciting alternative is microbial electrochemical cell (MXC), in whih anode respiring bacteria (ARB) work in syntrophy with fermenting bacteria and homo-acetogenic bacteria to convert complex organic compounds in biomass into electrical power or valuable products.
http://environmentalbiotechnology.org

CO_2 Capture

Electrochemical Capture: ASU with industrial and academic collaborators is developing a novel electrochemically mediated, energy efficient, CO_2-extraction system to capture and release a concentrated CO_2 stream from waste emissions to facilitate CO_2 recycling and reuse. The electrochemical device will run continuously on any source of electricity, and will be low in capital and operating costs.
Air Capture: The Center for Negative Carbon Emissions (CNCE) is advancing carbon management technologies that captures carbon dioxide from ambient air in an outdoor operating environment. Our aim is to demonstrate systems that over time increase in scope, complexity, reliability, and efficiency while lowering the cost of carbon dioxide capture from air, and provide the sustainable energy infrastructure design critical to achieving a carbon negative energy economy. **www.engineering.asu.edu/cnce/**