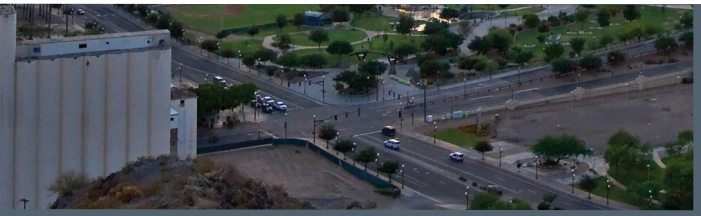

"**The world's energy system is at a crossroads.** Current global trends in energy supply and consumption are patently **unsustainable** — environmentally, economically, socially. But that can — and must — be altered; **there's still time to change the road we're on.**" *

- World Energy Outlook, 2008

***But time is running out.**

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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 energy challenges. LightWorks coordinates and develops strategic collaborations between our researchers and new potential partners.

Light-inspired solutions

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 collaborative 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 at relevant scales under real world operating conditions 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**

CO_2 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.

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.

Photosynthetic Factories and Microorganisms: 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. Another research focus is managing microbial communities to generate electricity and fuels from organic wastes.
http://environmentalbiotechnology.org

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: Light*Speed* Solutions communicates exciting innovations anywhere in the world aimed at using waste CO_2 as a feedstock to create liquid hydrocarbons using sunlight and brackish water initially hybridizing with natural gas to produce low carbon, scalable and infrastructure-compatible transportation fuels. Current research efforts at ASU focus on systems analyses of solar hybrids and redox active metal oxide thermochemical cycles to split CO_2 and H_2O.
www.lightspeedsolutions.org