

The Arizona Research Institute for Solar Energy

<http://www.azrise.org>

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- AzRISE was formed at the University of Arizona in September 2007
- Currently funded by the Arizona Board of Regents through the Technology and Research Investment Fund (TRIF)
- AzRISE is composed of faculty, staff and students from the Colleges of:
 - Engineering
 - Science
 - Optical Science
 - Architecture
 - Agriculture
 - Business



The Arizona Institute for Solar Energy

Vision: a world powered by renewable, clean energy where solar energy provides its natural share through the development of economic and efficient conversion devices and reliable energy storage systems.

Mission: to enable multi-disciplinary research, development and practical implementation of solar energy solutions to meet our energy needs by creating innovative collaborations in research, economic and public policy analysis and education/outreach.

Policy & Economics

- Economics of solar energy and public policy options
- Arizona specific, state, federal and global solar economics and policy analysis
- Incentive, tariff, regulation and renewable energy standard policy analysis
- Renewable energy /carbon credits and emission reduction regulation
- Market/risk analysis, best practices
- Land use analysis
- Salt storage and transmission within & beyond AZ
- Desalination technology, economics and environmental impact
- City, county and municipal planning solar energy implementation

AZRISE

An Integrated Approach is Required

UA Research in new PV materials

- New developments in nanostructured materials
 - Lead to an increase in efficiency with reduced losses
 - Lead to higher cell voltages
 - Promise improved, lower cost, multijunction cells
- New developments in nano-hybrid materials
 - Lead to inexpensive/disposable polymer solar cells
 - Lead to flexible solar cells

Solar Irradiance and Systems Performance:

- Insolation measurements and GIS mapping
- New tests for predicting lifetime and performance of solar cells
- Weather-mapping for economic performance predictions and for intelligent grid controls
- Large Dish Concentrators:
 - Applications with photovoltaic engine
 - Applications with thermal (Brayton) engine
 - Tests of large dish systems performance



UA Research in Solar Energy Energy Storage

- Underground Compressed Air Energy Storage (CAES) (1,100 psi, 75 atm)
 - Needs salt deposits (primary)
 - High efficiency and low price (65-85%)
 - Needs booster fuel for operating the secondary turbine (natural gas, hydrogen or biofuels)
- Lithium ion batteries (Andrew Burke)
 - High power Li-ion batteries are available
 - Very long life cycles are possible (hundreds of thousands)
 - Good solution for electrified transport with cost reduction
- Super-capacitors (Andrew Burke)
 - Large cells and modules are available with energy density of 5-10 kWh/kg
 - Very high power with acetonitrile ion conducting electrolyte
 - Potential use for smoothing power delivery
 - Long life, but costs are high



RIVERPOINT SOLAR RESEARCH PARK

- AzRISE
- SST
- University of Phoenix
- UA Agriculture
- UA Architecture



- Solar Concentrators
- Flat plate PV
- CAES
- Thermal storage
- Agriculture & biofuels
- Water recycling
- Education
- Visitor center



Arizona's Universities, Industry, Government and Utilities are uniquely positioned for Solar Energy Leadership

Solar Desalination

- Partnership with Biosphere Institute, Industry, Mexico
- Test co-generation of electricity and water
- Concentrated solar power conversion
- Develop new solar cells
- Evaporative desalination
- Test various salt concentrations to simulate agricultural run off, brackish water and ocean
- Study economics and environmental impact

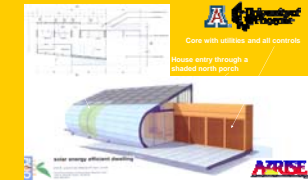


Student and Demonstration Projects

- Solar Decathlon: <http://www.solardecathlon.org/>
 - 20 schools (international) compete on the DC Mall to operate a house on solar energy for 2 weeks
 - UA team was selected to compete in 2009
 - Southwestern solar house design
 - Innovative designs for heating/cooling
- Solar Race Car: <http://www.solarcar.org/>
 - North American Solar Challenge
 - Arizona Solar Car Rally



Seed Pod – UA Solar Decathlon House



Arizona Solar House



Welded frame of the first unit of the house. A swivel design at the base allows the roof to be tilted up for the desired solar cell angle.