

SOUTHWEST ENERGY INNOVATION FORUM

Summary Report

October 18, 2010

Ewing Marion

KAUFFMAN
Foundation

SOUTHWEST ENERGY INNOVATION FORUM

Summary Report

October 18, 2010

Ewing Marion
KAUFFMAN
Foundation

Southwest Energy Innovation Forum Summary Report

Date of Event: October 18, 2010

Location: SkySong, the ASU Scottsdale Innovation Center, Arizona

Conveners: Arizona State University
Ewing Marion Kauffman Foundation
U.S. Department of Energy's Advanced Research Projects Agency
- Energy (ARPA-E)

Context

The Southwest Energy Innovation Forum was the last of three Energy Innovation events that developed from discussion and recommendations made at the Energy Innovation Conference held at the White House in May 2010. This regional forum was part of a national effort to drive clean energy innovation and propel economic development and job creation in the United States.

Participation and Description of Event

The Ewing Marion Kauffman Foundation, Arizona State University (ASU), and U.S. Department of Energy's Advanced Research Projects Agency - Energy (ARPA-E) co-convened a conference on Energy Innovation in the Southwest region of the United States that included participation by entrepreneurs, state government officials, representatives of academia, private-sector leaders, nonprofit leaders, and innovators on October 18, 2010.

The conference was designed to bring together diverse stakeholders in a forum to develop recommendations for growing regional energy innovation, building a network

for energy innovation efforts, and ensuring Federal support for innovative approaches and partnerships that could improve the nation's energy future. In the morning, attendees heard from several speakers prior to selecting one of three breakout sessions about corporate partnerships, investment, and state policy development. Following lunch, the group reconvened for an Innovation Panel, a selection of additional breakout sessions, and a closing panel. Afternoon breakout session topics focused on building research, technology, and industrial leadership in the Southwest for solar energy, energy storage, and advanced fuels. All sessions are briefly described below. Following the conference, attendees showcased breakthrough energy technologies from across the Southwest as part of ARPA-E's Technology Showcase.

Welcome

Rick Shangraw, senior vice president for Knowledge Enterprise Development, ASU, welcomed the group and outlined ten prescriptions for institutions of higher education to better support the commercialization of energy innovations. 1) Staff technology transfer offices with a balance of academics and industry-based entrepreneurs. 2) Configure technology transfer offices so that they are flexible and speedy. 3) Treat technology transfer offices as a service to faculty, not as a revenue generator. 4) Avoid standardized licensing agreements; these agreements ignore the nuances of different sectors. 5) Utilize technology transfer offices as engines to increase sponsored research rather than narrowly focusing on licensing. 6) Package and sell entire business concepts rather than early stage conventions and intellectual property models through university accelerators. For example, the ASU Biodesign Institute's

Impact Accelerator aims to increase the number and success rate of spinout companies by nurturing technologies through key stages of development and moving them into the private sector once they are viable. 7) Partner with other universities to market each other's technology portfolios. In 2009, ASU and the University of Pennsylvania entered into a formal partnership to help each other commercialize certain technologies. Both institutions hope this groundbreaking partnership will serve as a blueprint for similar alliances between other U.S. academic institutions. 8) Change promotion and tenure requirements to reward faculty members' patent production and entrepreneurial efforts. 9) Train and mentor postdoctoral students so they are prepared for industry careers, not just the academy. 10) Require principal investigators to attend an entrepreneurship course with topics ranging from finance to marketing.

ARPA-E Overview

Arun Majumdar, director, ARPA-E, provided an overview of ARPA-E's founding and a description of how energy innovation is at the core of our national, economic, and environmental security. Five years ago, the National Academies prepared *Rising Above the Gathering Storm*, a report that recommended a renewed effort to bolster U.S. competitiveness. Released in September 2010, *Rising Above the Gathering Storm, Revisited*, outlines progress and stagnation. Although ARPA-E's launch was an essential step in the right direction, many challenges remain: national debt has increased, other nations have made significant progress, and our ability to compete globally is decreasing.

ARPA-E is one of several important stakeholders in the energy innovation ecosystem. ARPA-E funds high-risk, high-reward research that is too risky for private sector investment but could have a large commercial impact and produce new learning curves and markets. For instance, ARPA-E set the goal of one dollar per watt fully installed solar by 2016, which Majumdar compared to President Kennedy's goal of reaching the moon. Batteries for Electrical Energy Storage for Transportation (BEEST) is an ARPA-E project that aims to develop a new generation of ultra-high energy density, low-cost battery technologies for long electric range plug-in hybrid electric vehicles and electric vehicles. Additional projects include Building Energy Efficiency Through Innovative Thermodevices (BEETIT) and Grid-Scale Rampable Intermittent Dispatchable Storage (GRIDS).

Remarks from Representative Harry Mitchell

Congressman Harry Mitchell emphasized the need to invest in high-risk and high-reward projects that will help rebuild our economy and radically reduce our dependence on foreign oil. Arizona has a huge potential to be a national leader and exporter of clean energy as evidenced by the funding of three out of four recent ARPA-E projects in Mitchell's congressional district. One company, Fluidic Energy, received a \$6 million ARPA-E grant to advance its green energy battery technologies. Mitchell also praised the U.S. House of Representative's recent passing of The America COMPETES Reauthorization Act which helps create high-tech and manufacturing jobs by helping small- and medium-sized manufacturers access capital to become more efficient and stay competitive.

Corporate Partnering to Bring Energy Innovation to Scale

Lesla Mitchell of the Kauffman Foundation moderated a panel with Gary Dirks, ASU LightWorks; Russ Frew, Lockheed Martin; James Mulroy, Raytheon Missile Systems; and, Brook Porter, Kleiner Perkins Caufield & Byers. With an audience composed of mostly small business owners in the alternative energy market, the panelists directed their remarks to alternative business models that can help smaller firms attain immediate capital. Two major suggestions for small business owners emerged from the discussion. First, decrease reliance on intellectual property as a source of funding and contextualize new products for investors. Just as Rick Shangraw suggested universities realign their technology transfer offices to sell developed business concepts rather than individualized intellectual property, Gary Dirks urged small businesses to package and market complete business models by acknowledging and embracing the financial and manufacturing processes required by a company's newest technology. Comprehensive models are more appealing to corporate investors looking to take products to scale. Second, network with corporations, the military, and a variety of venture capitalists and understand the strengths and weaknesses of their respective scales of investment. A diversified network will enhance a small business's visibility with potential corporate sponsors. Even as the network grows, it is essential to tailor messaging to each potential investor's needs, interests and ultimately, profit margin.

Investing in Energy Innovation

Paul Kedrosky of the Kauffman Foundation moderated this panel with Jim Croce, Nevada Institute for Renewable Energy Commercialization; Joel Kurtzman, Milken Institute; Sean Greene, Small Business Administration; and, Tom Cain, SAIL Venture Partners. The panel focused on what is essential to spur investment and innovation in the energy sector. Panelists held different viewpoints on the likelihood of investments occurring. Joel Kurtzman stated no shortage of capital exists for clean technology, with over a trillion dollars in excess reserves in banking and money markets. However, Tom Cain pointed out that clean technology requires a four to one dollar reserve, compared with other sectors that only need a one to one match. Moreover, structural market shortcomings create two major Valleys of Death (capital shortfalls) in the 1) initial stages of a technology's development, and 2) the more advanced stages when proving commercial scalability and viability.

Establishing clear energy policies will stimulate funding because regulation uncertainties stall investment. As Jim Croce indicated, the market is inefficient: fifty states with fifty different markets exist. This is unlike the pharmaceutical market where radical innovation is the lifeblood of industry and new discoveries can provide nationwide profits. Croce suggested that the private sector needs incentives, and it is the Federal government's role to provide them through policy and regulation reform and increases to federal research and development funding. Kurtzman suggested previous large-scale federal investments in projects such as the interstate highway system could serve as models for a project to modernize the power grid.

Developing State Policies for Energy Innovation

Mark Muro, Brookings Mountain West and Brookings Institution, moderated this session with Thomas Bowles, New Mexico Governor's Office; Kris Mayes, Arizona Corporation Commission; Rick Naimark, City of Phoenix; and, Tom Plant, Colorado Governor's Energy Office. Tom Bowles's opening remarks outlined three common themes that describe the role of the states to encourage energy research, development, deployment, and adoption: 1) education, 2) investment, and 3) coordination of multiple stakeholders. In addition to the promotion of STEM (science, technology, engineering, mathematics) education, states have a responsibility to educate the general citizenry about why clean energy is important to the future of the state (job creation, enhancing general well-being). States can help change consumer behavior by educating the public about energy efficiency strategies such as how to purchase solar panels and utilize smart thermostats. States also need to leverage federal investments by committing state resources through tax incentive programs, innovation funds, and land provisions for the development of projects such as transmission lines. According to Kris Mayes, states need to be deliberate about tax incentives because of the possibility of oversubscription by consumers. When discussing how to systematically coordinate efforts, Mayes also emphasized the importance of helping utilities prepare for "cascading natural deregulation," the exiting process that will occur when Americans realize they can leave their utility because of enhanced storage options. To prevent this exodus, utilities must re-assess their traditional role as service providers and become customer satisfiers; they can no longer base operational decisions on the supply side, but must also address demand.

Innovation Panel

Nick Donofrio of the Kauffman Foundation moderated this panel with Tom Baruch, CMEA Capital; Michael Crow, ASU; Ginger Lew, National Economic Council; and, Arun Majumdar, ARPA-E. Nick Donofrio defined innovation as the ability to see, create, and capture value where others cannot. Innovators need to understand their sector, yet be willing to look at their industry from a new perspective. Donofrio asked the panelists to comment on the relationship between innovation and speed.

According to Tom Baruch, in the venture capital arena there is a direct relationship between speed and innovation because investors are driven by the mathematics of compound interest. Other key components to an innovation ecosystem include an environment ripe for discovery and entrepreneurship and the capacity to understand customers' needs. Michael Crow used ASU as an example of an institution that embraces the importance of speed in the alignment of research teams, the transfer of the discovery of knowledge from the lab to market, and the evolution of the institution itself in response to the changing needs of society. Institutional innovation is needed to break down traditional structures and design what is needed for today. Arun Majumdar stressed although historically major changes have taken four to five decades to occur, we cannot wait this long. The next twenty years must be the most innovative time in U.S. history, or we will fall behind.

However, innovation is not always easy. Ginger Lew spoke of the glacial speed at which change occurs due to resistance to innovation and change. In addition, low literacy levels and the mismatch between labor skills and needs beg the question: Is the workforce ready to take on the jobs that we are creating? In response to a question

about the Federal government's future involvement, Lew responded that the government can create an environment ripe for job creation and innovation and provide the seed capital, but companies create new companies and create jobs. The Federal government creates enabling environments through regional projects such as energy innovation clusters and also through large-scale policy reform. However, policy reform is difficult because environmental debates are highly politicized and are often limited by policymakers' short-term analyses.

Building Research and Technology Leadership in the Southwest – Solar Energy Panel

ARPA-E's David Danielson moderated this panel with Roger Angel of REhnu, LLC and the University of Arizona; Bud Annan, Science Foundation Arizona; Joe Armstrong, Ascent Solar; and, Christiana Honsberg, ASU. The panel introduced regional innovators employing world-class research and development, and technologies to improve solar energy. Speakers explained their groundbreaking projects while highlighting regional opportunities in the Southwest.

Regional support can maximize the potential of solar energy. Twenty years ago, most people knew about cell phones, but did not own one; Honsberg envisions photovoltaics following a similar path to ubiquity. Scientists, stated Honsberg, are just beginning to tap the potential of photovoltaics, and the technology could be transformational to the energy sector. Roger Angel noted the one dollar per watt goal as a driver of research and development and innovation. To bring new technologies to scale, establishing diverse regional partnerships (including academia, research labs, government, and industry) is vital. Although regulators typically operate in a local

context, regional or national regulations could push the Southwest forward as a solar hub and exporter of energy.

Building Research and Technology Leadership in the Southwest – Energy Storage Panel

Moderator Mark Johnson of ARPA-E spotlighted the efforts of regional innovators Cody Friesen, Fluidic Energy and ASU Ira A. Fulton Schools of Engineering; and John Affinito, Sion Power. In addition, John Boyes, Sandia National Laboratories, shared his insights on the future of the energy storage panel market with technologies projected to cut across thermal, mechanical, and biological disciplines in a manner not seen today.

Cody Friesen presented some of his company's inventions and emphasized the positive environmental impact of his products that do not combine the storage of oxidant and reduction agents in a single battery cell. Oxidizing naturally from the atmosphere in these batteries significantly reduces production-based environmental degradation. Moreover, manufacturing batteries in this way reduces the risks associated with highly combustible reactions and higher energy density levels. Friesen also emphasized how his company successfully bridges the cultural gaps between manufacturing and sustainability sectors. John Affinito informed the audience of the diversity of his company's investment portfolio, ranging from Unmanned Air Vehicle batteries, to military portable power, stationary power and ultimately, electric vehicles.

Building Research and Technology Leadership in the Southwest – Advanced Fuels Panel

Eric Toone, ARPA-E, moderated this panel with Devens Gust, ASU Center for Bio-Inspired Solar Fuel Production; Mike Lynch, OPX Biotechnologies, Inc.; and, Wim Vermaas, ASU School of Life Sciences. This session highlighted three regional innovators who are developing alternatives to traditional petroleum-based resources. Devens Gust discussed how his research team exploits the physics and chemistry underlying photosynthesis to synthesize organic molecules that absorb sunlight and use the resulting energy to carry out basic processes such as energy transfer. The goal is to design new chemical systems for solar energy harvesting. Gust's processes have several advantages: relatively cheap components, efficiency, no requirement for arable land, no water usage (except as electron and proton source), no greenhouse gas emissions, essentially inexhaustible, and large capacity. Mike Lynch described how OPX Biotechnologies, Inc. developed a novel engineered microorganism that directly produces a biodiesel-equivalent electrofuel from H₂ and CO₂. The EDGE™ (Efficiency Directed Genome Engineering) technology aims to commercially produce acrylic acid at or below the cost of petroleum-based acrylic acid. Moving forward, Lynch is looking for technology, feedstock, downstream market, and commercialization partners.

Finally, Wim Vermaas outlined his laboratory's approach to increasing the efficiency of photosynthetic microbes. The Vermaas team is developing strains of a cyanobacterium that can become a biocatalyst and produce and secrete feedstocks for harvest being consumed, much like a cow giving milk. The main hurdle this research group must overcome is achieving profitability with this approach.

Building Industrial Leadership in the Southwest: Manufacturing and Deploying Technologies at Scale – Solar Energy Panel

David Danielson, ARPA-E, moderated this panel with Nolan Browne, Fraunhofer Center for Sustainable Energy Systems; Sean Gallagher, Tessera Solar; and, Richard Hayslip, Salt River Project. Richard Hayslip began by discussing how the Southwest can emerge as a solar energy leader by developing products that cater to a diversity of customers, including schools and nonprofit organizations, despite financial/budget and infrastructure limitations such as roof structures. One way to accomplish this is through solar panel “community gardens” that capture energy on the ground rather than on roofs. The Salt River Project aims to initially roll out this model to a limited category of customers. In addition to catering to customer needs, Hayslip identified transmission lines that cross state lines as an indicator for jointly shared projects with utilities in California and Utah.

Sean Gallagher described the SunCatcher, a parabolic mirror dish developed by Tessera Solar, as a prime example of how the Southwest is on track to emerge as a test bed for new solar technologies. Gallagher also highlighted the importance of working with local suppliers. According to Nolan Browne, the Southwest has an opportunity to be an epicenter for solar because it has all of the prerequisites: inexpensive land, high insulation, relatively large population centers, and forward thinking policymakers. However, the region still needs: coordinated research and development spending, streamlined policies to allow for rapid deployment, reliability and transparency to facilitate financing and adoption, and balanced regional environmental regulation.

Building Industrial Leadership in the Southwest: Manufacturing and Deploying Technologies at Scale – Energy Storage Panel

Mark Johnson of ARPA-E moderated this panel with Massoud Amin, University of Minnesota; Grover Coors, Ceramatec; and, Konrad Jarausch, Passport Capital. Many barriers prevent the development and implementation of energy storage, including economic risks, financial uncertainties, regulations issues, and policy shortcomings. Nevertheless, smart energy storage is key to the energy sector's future.

The lack of a national energy policy creates problems for energy storage. Massoud Amin indicated deficiencies in a national energy vision cause the vulcanization of the industry. Establishing directives and incentives is vital. Grover Coors spoke to the importance of engineering low cost, efficient batteries. Yet, he also mentioned the United States is months away from losing ground in the global battery sector. Konrad Jarausch lamented misaligned incentives and that regulations need modifications. The government should amend these problems, he said. The United States is ripe with innovation, but individuals face challenges scaling their ideas and products. Amin suggested entrepreneurs gain end-to-end support to ensure quality innovations reach the marketplace. Mark Johnson noted states like Oregon are motivated to find energy storage solutions at the local level to provide energy for neighbors with high energy usage, like California. Johnson questioned how to align policy incentives and indicated that the state that determines how to handle their public utilities will garner success.

Building Industrial Leadership in the Southwest: Manufacturing and Deploying Technologies at Scale – Advanced Fuels Panel

Eric Toone moderated this session with Tom Hicks, U.S. Navy; John Steedman, BP Alternative Energy; and, Dave Thompson, Diversified Energy. Eric Toone set the stage for the discussion about challenges and opportunities for scaling advanced fuel production when he said that "liquid fuels are here, and they will be here for a very long time." However, he also cautioned that massive oil subsidies of \$300 billion per year are massive policy barriers to the development of greener alternatives.

Tom Hicks identified opportunities for scaling advanced fuel production by leveraging the military as a core customer base. The Federal government is responsible for 2 percent of energy consumption in the United States, and the U.S. Navy controls 93 percent of that. Changing the military's energy consumption could change the demand of the market and is in line with the military's security mission to reduce our dependence on foreign oil.

Energy Innovation: From Concept to Market

Michael Crow, ASU, moderated the closing panel with Nick Donofrio, Kauffman Foundation; Paul Kedrosky, Kauffman Foundation; Ginger Lew, National Economic Council; and, Arun Majumdar, ARPA-E. Michael Crow began by asking the panel why bringing energy innovations from concept to market is so difficult in the United States. Paul Kedrosky asserted that we are limited by our current infrastructure. We have the most extensive and established environment in the world and it is holding us back. Arun Majumdar recognized our infrastructure inertia also may have some

positive consequences when compared with China, a nation that is moving significantly faster than the United States. China is not investing in carbon capture, and since our infrastructure is old, we will need to put in new plants that will help us ultimately enter the clean energy market faster. According to Ginger Lew, our democratic form of government slows down the pathway to commercialization by encouraging tremendous participation and consequently, tremendous diversity of opinions. Nick Donofrio agreed that consensus building is different, but added that change will not occur until the public is uncomfortable with the status quo and sees a reason to change. At the end of the session, panelists offered suggestions about how to address these challenges. Many of these suggestions are listed below.

Conclusion and Recommendations

Participants at the Southwest Energy Innovation Forum offered a variety of recommendations, listed below, to improve the nation's energy future:

Support human capital development

- Support the retention of human capital in the STEM (science, technology, engineering, mathematics) fields in K-12 and higher education.
- Advance entrepreneurship education in partnership with STEM efforts (STEEM).

Democratize access to the power grid

- Open interconnection to the public utility grid for researchers and graduate students.

Support small businesses' role in advanced manufacturing

- Provide financing and support for advanced manufacturers in the United States.

Foster cross-sector collaboration

- Enhance the navigability of the energy innovation network.

Educate the public about energy usage and strategies to promote energy efficiency

- Understand the customer base when marketing the advantages of reducing energy usage.

Collaborate across government

- Leverage limited Federal resources by identifying three or four national priorities for multiple agencies to tackle together.

Next Steps

The Kauffman Foundation established an Energy Innovation Network that aims to accelerate energy innovation by connecting the dots between technology, entrepreneurship, finance, and policy, making the pathway for entrepreneurs more transparent. The network provides an opportunity for members to continue the conversation sparked at the Southwest Energy Innovation Forum and suggest policy recommendations by visiting <http://www.energyinnovationnetwork.org/>.

Appendix: Attendee List

246 participants convened at the Southwest Energy Innovation Forum at SkySong, the ASU Scottsdale Innovation Center, in Arizona on October 18, 2010.

First Name	Last Name	Organization
Mukund	Acharya	Honeywell Aerospace
John	Affinito	Sion Power
Becky	Allen	Arizona State University
Charles	Allen	Arizona State University
Massoud	Amin	University of Minnesota
Roger	Angel	REhnu, University of Arizona
Bud	Annan	Solar Technology Institute
Joe	Armstrong	Ascent Solar
Christian	Ayerh	Energy Derived
Larry	Baker	Sustainable Energy Solutions, LLC
John	Ballard	Salt River Project
Shannon	Bard	SN Tech, Inc.
Tom	Baruch	CMEA Capital
Terry	Bautch	Ernst & Young
Andrew	Baxter	Sustainable Energy Solutions, LLC
Parker	Bell	Booz Allen Hamilton/ARPA-E
David	Berry	Western Resource Advocates
John	Blakney	Indo-American Chamber of Commerce
Karim	Boutros	HRL Laboratories
Thomas	Bowles	New Mexico Governor's Office
John	Boyes	Sandia National Laboratories
Tom	Brokaw	HyProSys, LLC
David	Brooks	Solar Technology Research Corporation
Nolan	Browne	Fraunhofer Center for Sustainable Energy Systems
Jonathan	Burbaum	ARPA-E
Carrie	Burchard	Sandia National Laboratories
Tom	Cain	SAIL Venture Partners
Giusy	Cannone	Kauffman Foundation
Li Han	Chan	Nevada Institute for Renewable Energy Commercialization
Dhanesh	Chandra	University of Nevada, Reno
Scott	Cheney	Diversified Energy Corporation
Shu-Fen	Chiang	Lewis & Clark Law School
Manuel	Cisneros	Somerton Solar R & D, LLC
Ken	Clark	Ken Clark Independent Consulting
Jeff	Collier	Energy Derived
Brendan	Cook	EcoAid
Grover	Coors	Ceramatec, Inc.

Edward	Cortright	Hyriser Corporation
Jim	Croce	Nevada Institute for Renewable Energy Commercialization
Michael	Crow	Arizona State University
Jim	Crowell	e~TECH
Marc	Cummings	Battelle/Pacific Northwest National Laboratory
William	Dabars	Arizona State University
David	Danielson	ARPA-E
Aravind	Dasu	Energy Dynamics Laboratory
Rick	Davis	PowerVerde, Inc.
Kimberly	de los Santos	Arizona State University
Jorge	de los Santos	Predictive Technologies
Henk	de Waard	NanoVoltaix, Inc.
Andrew	Dillon	Varentec
Gary	Dirks	Arizona State University
Nick	Donofrio	Kauffman Foundation
Darrel	Downing	Downing Aviation Associates
Jim	Egerton	Magnolia Solar
Elango	Elangovan	Ceramatec, Inc.
James	Elliott	General Atomics
John	Englander	Arizona Department of Environmental Quality
Patricia	Erfman	Corporate Resource and Enterprise Matrix
Anthony	Evans	Arizona State University
Harold	Fajardo	International Commercial Firm
Shahin	Farshchi	Lux Capital
David	Follette	REhnu, LLC
Russell	Frew	Lockheed Martin
Cody	Friesen	Arizona State University
John	Gage	Neofocal
Sean	Gallagher	Tessera Solar
Alan	Gertler	Desert Research Institute
Philip	Goelet	Acidophil, LLC
Greg	Golden	Arizona State University
Herbert	Goronkin	Lux Capital
James	Goulka	Lone Mountain Associates LLC
Brian	Gray	PowerVerde, Inc.
Sean	Greene	U.S. Small Business Administration
Scott	Grimshaw	Colnatec
Vic	Grosvenor	Spark Technologies
Douglas	Grotjahn	San Diego State University
Kishor	Gupta	Georgia Institute of Technology
Devens	Gust	Arizona State University
Zach	Hamilton	Devil Wash
Todd	Hardy	Arizona State University
Andrew	Hargadon	Kauffman Foundation
Joseph	Hartvigsen	Ceramatec, Inc.
Herb	Hayden	Southwest Solar Technology Inc.

Chad	Haynes	Booz Allen Hamilton/ARPA-E
Richard	Hayslip	Salt River Project
Pete	He	The Dial Corporation, Henkel
Oliver	Hemmers	University of Nevada, Las Vegas
Peter	Henig	Greenhouse Capital Partners
Mark	Henley	Boeing Research and Technology
Kelly	Herbst	NAVITASMAX
Chris	Herbst	Eaton Corporation
Bo	Hesselbaek	Vestas Americas
Tom	Hicks	U.S. Navy
Cassie	Hilder	Arcadia Biosciences
Chris	Hoeger	Sustainable Energy Solutions, LLC
Leo	Holland	General Atomics
Christiana	Honsberg	Arizona State University
Qiang	Hu	Arizona State University
John	Hu	Koch Industries Inc.
Robert	Hults	City of Scottsdale
Pamela	Hurt	Kauffman Foundation
Raphael	Hyde	Energy Derived
Paul	Israelsen	Energy Dynamics Laboratory
Monica	Iverson	Arizona State University
Michael	Jaap	CarbonTech
Tim	James	Arizona State University
Wendy	Jameson	Colnatec
Konrad	Jaraus	Passport Capital
Jim	Jaskie	Quantum Dot Solar
Keith	Johnson	PowerVerde, Inc.
Mark	Johnson	ARPA-E
Debra	Johnson	Eco-Edge, LLC
Mukund	Karanjkar	Technology Holding LLC
Marcia	Karasek	CHOW&Co
Paul	Kedrosky	Kauffman Foundation
Anna	Keilty	Arizona State University
David	Keogh	General Atomics
Kent	Kernahan	Array Converter
Jason	Keyes	Keyes & Fox, LLP
Ryan	Klein	Balfour Beatty Energy Services
Andrew	Kolikoff	SynergySM
George	Konrad	PowerVerde, Inc.
Shane	Kosinski	ARPA-E
Dmitri	Kossakovski	Zt Plus
Joel	Kurtzman	Milken Institute
Steve	Leathers	Terrasano, Inc.
John	Lent	Applied Thermal Systems Inc.
Rachel	Levinson	Arizona State University
Ginger	Lew	National Economic Council
Yingfeng	Li	Texas A&M University
Jerry	Lin	Arizona State University
Matthew	Lipscomb	OPX Biotechnologies, Inc.

Pete	Lomeli	Central Arizona College
Eric	Lougher	Southwest Solar Technologies
Michael	Lynch	OPX Biotechnologies, Inc.
Arun	Majumdar	ARPA-E
Joseph	Manzo	Mantere, LLC
Kris	Mayes	Arizona Corporation Commission
Craig	Mc Kenzie	Pacific Air Conditioning Services
Jeffrey	McAulay	Fraunhofer Center for Sustainable Energy Systems
Timothy	McDonald	Arizona Public Service
John	McGowen	Arizona State University
Erin	McKillop	Vestas Technology R&D Americas
Steve	McKnight	PowerVerde, Inc.
David	Miller	Faradaic Enterprises, Inc.
Indu B	Mishra	Kanan Associates Inc.
Manoranjan	Misra	University of Nevada, Reno
Lesa	Mitchell	Kauffman Foundation
Harry	Mitchell	U.S. House of Representatives
Mitzi	Montoya	Arizona State University
David	Morgan	GreNu Energy Corporation
John	Mott	Los Alamos National Laboratory
James	Mulroy	Raytheon Missile Systems
Mark	Muro	Brookings Institution
Rick	Naimark	City of Phoenix
Anthony	Nickens	Ceramatec, Inc.
David	Nielsen	Arizona State University
Andrew	Norman	Innovations & Technology Development
Lee	Nusser	PowerVerde, Inc.
Jim	O'Brien	Arizona State University
Michael	O'Reilly	Girvan Institute of Technology
Thomas W.	Oakes	Solar Hydrogen Energy Co.
David	Ochi	Green Global LLC
Miodrag	Oljaca	Cabot Corporation
Joe	Ortiz	Sustainable Resources Inc.
Felix	Ortiz III	Green University, Inc
Sethuraman	Panchanathan	Arizona State University
Billy	Parish	Solar Mosaic
Shefal	Patel	Massachusetts Institute of Technology Sloan School of Management
Patrick	Phelan	Arizona State University
Matthew	Phillips	Flint Hills Resources
Thomas	Piechota	University of Nevada, Las Vegas
Tom	Plant	Colorado Governor's Energy Office
Ken	Polasko	Arizona Technology Enterprises
Ken	Pollock	EcoAid
Brook	Porter	Kleiner Perkins Caufield & Byers
Brian	Quinn	Stirling Energy Systems
Saqib	Rahim	ClimateWire
Eric	Ramberg	Errcive, Inc.
BJ	Raval	GIS Southwest
Kevin	Reinhart	Arizona State University
Michael	Reppenhagen	Arizona State University
Matt	Ringer	National Renewable Energy Lab

Bruce	Rittmann	Arizona State University
Brad	Robbins	Teradyne, Inc.
Justin	Roberts	Chebel
Gordon	Roesler	USC Information Sciences Institute
Julia	Rosen	Arizona State University
Ross	Russo	Wildcat Discovery Technologies
Leshika	Samarasinghe	ARPA-E
Richard	Schleier	Corporate Resource and Enterprise Matrix
Rick	Shangraw	Arizona State University
Ben	Shelef	Heliocentric Solar
Feng	Shi	Northern New Mexico College
Tsutomu	Shimomura	Neofocal
Neal	Shinn	Sandia National Labs
David	Shum	ARPA-E
Vikram	Singh	Stirling Energy Systems
Mel	Slater	Quantum Dot Solar
Paul	Smith	Plasma Kinetics Corporation
Stacey	Smith	Plasma Kinetics Corporation
Wesley	Smith	Southwest Solar Technologies
Andrew	Soulier	Ernst & Young
Doug	Speight	Oak Ridge National Lab
Rich	Sporski	Iteknowledgies
Barry	Sprague	Integrated Organic Energy, LLC
John	Steedman	BP Alternative Energy
Gary	Stepenoff	Integrated Organic Energy, LLC
Scott	Stepenoff	Integrated Organic Energy, LLC
David	Stone	Celestial Technologies Corporation
Michael	Swords	University of California, Los Angeles
Anjali	Talekar	University of Nevada, Reno
Yong	Tao	University of North Texas
Karla	Teixeira	Arizona Commerce Authority
Dave	Thompson	Diversified Energy
Alan	Thompson	Salt River Project
Charlotte M.	Thornton	Stanford University
Eric	Toone	ARPA-E
Lan Anh	Tran	California Public Utilities Commission
Robert J.	Trzepakowski	Salt River Project
Manthou	Tsiouris	Iteknowledgies International
Kent	Udell	University of Utah
Elaine	Ulrich	Representative Gabrielle Giffords
Ken	Valdez	GreenVolt Systems
Jos	van Boxel	Arcadia Biosciences
Ravi	Vannela	Arizona State University
Wim	Vermaas	Arizona State University
Brian	Vetere	Mantere, LLC
Sabarish	Vinod	Lincus, Inc.
Sanjay	Wagle	ARPA-E
Richard	Wiener	Research Corporation for Science Advancement

Ken	Williams	CPFD Software
Lori	Williams	CPFD Software
Stafford	Williamson	DaoChi Energy of Arizona
Michelle	Witt	Impact Technologies LLC
Steven	Wood	Tempronics
Sean	Wright	EPRI
John	Wright	GreenVolt Systems
Angelo	Yializis	Sigma Technologies International
Larry	Yount	LaunchPoint Energy and Power (LEAP)
Wei	Yuan	Arizona State University
Andrew	Zaitsev	Quantum-D Solar
Mark	Zediker	FORO Energy
Yong-Hang	Zhang	Arizona State University
Ted	Zoller	University of North Carolina at Chapel Hill
Bilal	Zuberi	General Catalyst Partners