transform

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he outcome is sustainability



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overcoming stone age logic a challenge to universities

Through a remarkable manipulation of limited knowledge, brute force, and an overwhelming arrogance, humans have shaped a world that in all likelihood cannot sustain the standard of living we have come to take for granted. Our approach to energy, to look at only one sector, epitomizes our limitations. We remain fixated on short-term goals and a simplistic model governed by what I call "Stone Age logic." Find it, burn it, bury it — our dependency on fossil fuels would be worthy of cavemen.

Fortunately, we seem to be slowly moving out of the final decades of the Stone Ages. Although the general public and especially our younger generations have begun to think in terms of sustainability, the task remains to improve our capacity to implement change through knowledge and sound policy decisions. Our approach must be transformative rather than incremental.

Progress toward sustainability will require the reconceptualization and reorganization of our ossified knowledge enterprises. Our universities will need to drive innovation at the same time we forge closer ties to the private sector and government alike. To realize the potential of this moment will require both a focused collective commitment and the realization that sustainability, like democracy, is not a problem to be solved but rather a challenge that requires constant vigilance.

-Michael M. Crow, from "Overcoming Stone Age Logic," Issues in Science and Technology, December 2008



ASU is a New American University — a place where knowledge informs decision-making, research and study transcend academic disciplines, students learn from the world around them, and local solutions have a global impact. Please join us in transforming the world.

Michael M. Crow President, Arizona State University



Global Institute of Sustainability ASU's sustainability commitment reaches across all colleges and institutes

| Biodesign Institute |
|------------------------------------------------------------|
| W. P. Carey School of Business |
| Herberger Institute for Design and the Arts |
| Mary Lou Fulton Teachers College |
| Ira A. Fulton Schools of Engineering |
| Graduate College |
| Health Solutions |
| Barrett, the Honors College |
| Walter Cronkite School of Journalism and Mass Communicatio |
| Sandra Day O'Connor College of Law |
| School of Letters and Sciences |
| College of Liberal Arts and Sciences |
| New College of Interdisciplinary Arts and Sciences |
| College of Public Programs |
| School of Sustainability |
| College of Technology and Innovation |
| University College |

how a university is inventing a sustainable future

Sustainability is the defining challenge of our time. Unprecedented global growth and consumption have created dramatic impacts for society and our planet. How we respond will determine whether the 21st century is one of rebirth and prosperity or an unprecedented disaster for people and nature alike.

Universities have always played a special role in finding answers to critical issues, but to solve highly complex, global-scale sustainability problems, universities must fundamentally change. At Arizona State University, we are committed to this goal. We restructured our academic organization and established the Global Institute of Sustainability, and within it we established the first-ever School of Sustainability. We believe that sustainability should transcend all academic disciplines, the pace of discovery has to accelerate, and our institutions must educate leaders capable of solving sustainability problems across the world.

During our transformation under the direction of ASU President Michael Crow, many faculty played critically important roles in shaping the Institute, notably professors Charles Redman, Jon Fink, Jim Buizer, and Rick Shangraw. Universities alone, however, cannot create a sustainable future. Sustainability will require the efforts of individuals and leaders at every level of society, from government and business to philanthropy and science. Together, we can rethink and reinvent the future of a world at risk.

Rob Melnick Executive Dean and Presidential Professor of Practice Global Institute of Sustainability / School of Sustainability



Sander van der Leeuw Dean and Professor School of Sustainability





Sustainability House at Barrett, the Honors College, provides students with a comprehensive sustainable living and learning residence.

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the will to go first

At ASU we think it's incumbent upon us to think differently. By breaking the mold of traditional universities, ASU has become a place that trains leaders, implements change, and embraces an analytical focus on global solutions.

how ASU is leading





Global Institute of Sustainability provides leadership, coordination, and support for university sustainability initiatives

School of Sustainability educates the next generation of sustainability practitioners, thinkers, entrepreneurs, and leaders

sustainability curriculum across ASU directs course work, research, and outreach toward solving today's most important problems

sustainable practices commitment guides operations across all units at all four campuses

Presidents' Climate Commitment

Sustainable Materials Lab

ASU President Michael Crow is a member and founding co-chair of the American College and University Presidents' Climate Commitment, which calls for colleges and universities to exercise leadership in minimizing global warming emissions. The effort has attracted nearly 700 signatory schools representing almost 6 million students. All have pledged to direct their institutions in the development of unique, comprehensive plans to achieve climate neutrality on their campuses, accelerate relevant research, and provide the critical education necessary to help society re-stabilize the world's climate.

Higher education leaders, business officers, and others convened at the Climate Leadership Summit in Washington, D.C., sponsored by the American College and University Presidents' Climate Commitment.



how do we create a sustainable way of life?

Through research and freely shared knowledge, we can create a socially, economically, and ecologically responsive society — a global community that understands the consequences of our actions and adapts accordingly.

organizing to lead the way

ASU's guiding principles for sustainability

identify the grand challenges of sustainability

treat science and social context equally

span boundaries — institutional, community, global

engage decision-makers with new tools

accept risk and accelerate impact

lead by example

involve all of ASU

unlocking complex issues: sustainability scientists and scholars

How do we promote human prosperity and wellbeing in an equitable manner while protecting and enhancing Earth's life support systems?

To meet this challenge, the Global Institute of Sustainability has appointed more than 250 Sustainability Scientists and Scholars from across the university. Their breadth of knowledge ranges from the natural and social sciences to medicine, engineering, mathematics, planning, business, public policy, law, design, humanities, and the arts.

They are the faces of an emerging new field **sustainability science** – a comprehensive, interdisciplinary, and participatory approach to solving complex problems that draws on a wide spectrum of expertise.

Focusing knowledge and coordinating research across the university accelerates discovery and new solutions. By formalizing a community of scientists and scholars, ASU leverages the broad reach of sustainability activities and education underway.





Distinguished Sustainability Scientist, Global Institute of Sustainability

Director, ASU LightWorks

U.S. Chairman, China-US Centre for Sustainable Development

Wrigley Chair in the Practice of Sustainable Energy Systems, School of Sustainability

Gary Dirks



Gary Dirks earned a doctorate in chemistry from ASU and retired as president of BP Asia Pacific and BP China. He now works to bring together a variety of emerging technologies related to the power of sunlight as part of the ASU LightWorks initiative, which concentrates on the complexities of moving to a more sustainable energy future.

ASU LightWorks facilitates research and advancement of algae biomass and artificial photosynthesis for transportation fuels, and economically viable, high-efficiency photovoltaics for electricity generation. The initiative supports policy and implementation of energy solutions and the education of future energy leaders. Because energy is integral to all aspects of society, ASU LightWorks takes a transdisciplinary and holistic approach to create unique and differentiated paths to address energy challenges.

To foster increased collaboration among ASU's growing number of **Sustainability Scientists and Scholars**, the Institute provides meeting space, telecommunications facilities, research proposal services, administrative assistance, and communications support. These services and others help sustainability scientists and scholars:

network with experts in many academic disciplines

advise School of Sustainability graduate students

participate in strategic planning for sustainability

collaborate on sustainability research





Chief Scientist, Center for Sustainable Health, Biodesign Institute

Professor, Mary Lou Fulton Teachers College

Lee Hartwell

Virginia G. Piper Chair of Personalized Medicine

Distinguished Sustainability Scientist, Global Institute of Sustainability



Lee Hartwell was awarded the 2001 Nobel Prize in Physiology or Medicine for his identification of genes that control the cell cycle, a discovery that opened new approaches to understanding cell division and provided insights into the mechanisms underlying cancer. He is chief scientist at the Biodesign Institute's Center for Sustainable Health.

Through local, national, and international collaborations, Hartwell works to improve medical diagnostic tools to identify high risk individuals and detect diseases earlier, when they are more easily cured. His goal is to more accurately match therapy to the patient to improve health outcomes and reduce costs. Hartwell is also working in teacher education to incorporate sustainability science at the K-12 level.

how do we address the global challenges to sustainability?

enduring challenges

design socially, economically, ecologically healthy cities secure energy for a growing population cultivate environmental resilience ensure universal access to clean water mitigate and adapt to climate change create sustainable pathways for global development

emerging challenges

inform and comprehend decision-making understand and impact social transformation envision a socially, economically, ecologically prosperous world focus information, technology, materials to produce meaningful change nourish a growing global population map an uncertain future

framing issues finding answers

Forging meaningful solutions to the challenges of sustainability demands a strategic framework. ASU's approach builds upon four broad-based themes that span disciplines, campuses, and institutional boundaries.

four cornerstones



create solutions through research – apply knowledge and innovation for transformative global impact

educate

future leaders — give students the tools to discover, create, and deploy solutions to sustainability challenges





demonstrate sustainable business practices — provide a model for the campus and the world beyond

expand global impact—connect with communities through strategic partnerships and collaborations



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"Students who major in sustainability at ASU focus on developing solutions to specific grand challenges of sustainability. By drawing on faculty from multiple disciplines and applying problem-based approaches to research, they learn how to link science to action." Elizabeth Capaldi, Executive Vice President and Provost, ASU

setting a new course

ASU's **School of Sustainability** is the first of its kind: a comprehensive degree-granting program with a transdisciplinary focus on finding real-world solutions to environmental, economic, and social challenges.

Its mission is to bring together multiple disciplines and leaders to create and share knowledge, train a new generation of scholars and practitioners, and develop practical solutions to some of the most pressing challenges of sustainability.

Study in the School of Sustainability emphasizes experiential learning, research with faculty, corporate and K-12 work, community service, and leadership development.



Foundations of Sustainability Education

Business practices and economicsClimate change and adaptationEcosystem alteration and biodiversityEnergy, materials, and technologyFood systemsFuture and systems thinkingInternational developmentPolicy and governanceSocial and behavioral change, ethicsUrbanizationWater quality, use, and supply

School of Sustainability Degrees and Programs

Undergraduate Bachelor of Arts Bachelor of Science Minor in Sustainability

Graduate

Master of Arts Master of Science Master of Sustainable Solutions* Doctor of Philosophy Peace Corps Master's International U.S. Army/Army National Guard Certificate in Sustainability Leadership

Undergraduate Concentrations

The School of Sustainability collaborates with other schools and colleges (e.g., Business, Engineering, Public Programs) to provide classes for undergraduate concentrations in sustainability.

* Pending ABOR approval

Professor of Practice, Sandra Day O'Connor College of Law

Kris Mayes

Faculty Director, Program on Law and Sustainability, Sandra Day O'Connor College of Law

Senior Sustainability Scholar, Global Institute of Sustainability



Kristin Mayes served on Arizona's utility regulatory commission from 2003 to 2010. As chair of the commission, she coauthored the state's renewable energy standard, which contains the most aggressive distributed generation requirements in the U.S. She also helped establish one of the most ambitious energy efficiency standards in the nation.

At ASU's Program on Law and Sustainability, Mayes brings together professors and students from the College of Law and the School of Sustainability to help corporations, nonprofits, and governments navigate the legal issues surrounding renewable energy. Students in the program also study the future laws and policies needed to create a sustainable energy economy.

bridging disciplines, educating leaders

ASU has over 500 classes that address sustainability. Degree programs with a focus in sustainability studies continue to evolve across the university.

Ira A. Fulton Schools of Engineering provide a full range of degree programs in sustainable engineering and related fields such as decision systems engineering, bioengineering, and materials science. Among the five schools of engineering, the School of Sustainable Engineering and the Built Environment addresses society's critical need for sustainable infrastructure. In addition, the Fulton Undergraduate Research Initiative gives students research opportunities and access to advanced technologies and facilities.

The W. P. Carey School of Business offers a bachelor's degree in business with a concentration in sustainability for students to align sustainability with a profitable approach to business planning. Classes are taught in conjunction with the School of Sustainability and are also offered by the New College of Interdisciplinary Arts and Sciences.

The New College of Interdisciplinary Arts and Sciences provides a highly interdisciplinary degree in life sciences with a concentration in environmental science. The program addresses sustainability through courses in natural sciences, ethics, and policy. The College's Division of Mathematical and Natural Sciences offers several courses that help students from diverse majors and disciplinary backgrounds understand and articulate the importance of sustainability.

Professor, School of Sustainable Engineering and the Built Environment, Ira A. Fulton Schools of Engineering

Lincoln Professor of Engineering and Ethics Professor of Law Director, Center for Earth Systems Engineering and Management

Braden Allenby

Chair, Consortium for Emerging Te Military Operations, and Nationa

Distinguished Sustainability Scientist, Global Institute of Sustainability



Robotics. Controllable insects. Miniaturized surveillance mechanisms. These pioneering topics are a research focus for Brad Allenby, who has been tapped as a Stockdale Fellow by the U.S. Naval Academy to explore the sustainability implications of emerging military technologies. He also directs an international initiative through IEEE, the world's leading technical professional association, to apply expertise in information and communications technology toward solving sustainability problems.

Allenby was named a Carnegie Foundation U.S. Professor of the Year in 2008. His courses in Earth systems engineering, industrial ecology, and science and technology policy are frequently ranked by students as among the most valuable they have taken.

Herberger Institute for Design and the Arts offers a doctoral program in design, environment, and the arts that addresses sustainable design challenges and interdisciplinary research. The program provides experiences for those pursuing careers in environmental and energy issues, as well as for those wishing to teach in the architecture, art, or design fields.

The School of Geographical Sciences and Urban Planning provides an interdisciplinary, accredited professional master's degree in urban and environmental planning that includes urban sustainability, urban design, spatial and economic analysis, environmental planning, transportation, and international planning among its areas of focus. Students in this program may pursue a concurrent master's degree with the School of Sustainability.

The School of Public Affairs in the College of Public Programs offers two concurrent master's degrees with the School of Sustainability. Students working toward the Master of Public Administration or the Master of Public Policy can take advantage of this opportunity.

ASU's Mary Lou Fulton Teachers College uses a collaborative approach to give new teachers a solid foundation in sustainability and other sciences. The College's Reforming Science Education for Students and Teachers curriculum brings together leading scientists, education experts, and technology specialists to develop courses that are grounded in the National Science Standards and employ advanced digital learning resources.

The Sandra Day O'Connor College of Law is partnering with the School of Sustainability and other ASU units to develop one of the legal academy's first integrated curriculums in law and sustainability for programs at the J.D. and master's level. The College's Center for Law, Science & Innovation also offers a Program on Law and Sustainability, which brings together legal scholars, scientists, planners, and others in a joint investigation of how to reorient core law and governance structures in a world of finite resources.

Regents' Professor and Walter Isard Chair, School of Geographical Sciences and Urban Planning, College of Liberal Arts and Sciences



Member, National Academy of Sciences

Luc Anselin is one of the principal developers of spatial econometrics. This field analyzes patterns of data related to specific locations, ranging from local to global, to determine their influences on social, economic, and environmental policy issues.

Director, GeoDa Center for Geospatial Analysis and Computation

Anselin also developed SpaceStat and GeoDa software packages, comprehensive spatial data tools he has applied to his work in environmental and regional economics, epidemiology, criminology, and political science. He is a fellow of the Regional Science Association International and recipient of the William Alonso Memorial Prize for Innovative Regional Science. He teaches courses on spatial statistics and geographic information analysis.



"Sustainability is larger than one person, one company, or one country. Its scope, scale, and importance demand unprecedented and swift solutions to environmental protection and other complex problems."

Julie Ann Wrigley, co-founder, Global Institute of Sustainability and School of Sustainability

CAP LTER technicians and graduate students surveying desert study plots in the city of Phoenix

tackling the challenge of rapid urban growth

For more than a decade, ASU's Central Arizona — Phoenix Long-Term Ecological Research (CAP LTER) program has investigated the interrelationships between urban development and the ecology of the city. One of only two National Science Foundation LTER sites with a focus on urban ecology, and the only one focused on arid urban lands, CAP LTER's research results can be applied to other cities across the globe that are experiencing growth under changing climate conditions.

Morrison Institute for Public Policy, in the College of Public Programs, addresses policy issues critical to Arizona. Among other works on sustainability, the Institute produced Sustainability for Arizona: The Issue of Our Age, a landmark study analyzing the sustainability challenges of urban growth and rural development, and Watering the Sun Corridor, which examines water use, supply, and future demand for the Central Arizona urban region, including Phoenix and Tucson.

ASU leads the Power Systems Energy Research Center, a far-reaching collaborative research project established by the National Science Foundation to transform the existing electric distribution system and create the world's future smart grid. The project includes 13 universities and 36 industry partners across the U.S. and in Canada. Among its top challenges, the Center is creating ways to seamlessly integrate rapidly increasing amounts of renewable energy into the electric grid system.

Professor of Ecology, Evolution, and Environmental Science, School of Life Sciences, College of Liberal Arts and Sciences

Fellow, American Association for the Advancement of Scie nce Nancy B. Grimm

Teaching Faculty, School of Sustainability

Senior Sustainability Scientist, Global Institute of Sustainability



Nancy Grimm studies how climate variability and change and human interactions with the environment affect urban and stream ecosystems. She was the founding lead PI and co-director of one of the first transdisciplinary investigations of an urban ecosystem - a long-term study of the Phoenix metropolitan region that involves more than 100 scientists.

Grimm's findings on the role urbanization plays in environmental change have been published in *Science* magazine and in numerous other publications. She was a contributing author to the U.S. Global Change Research Program's Second National Climate Assessment (2009), and is a lead author for the Third National Climate Assessment (2013).

crossing disciplines, solving problems

The **College of Liberal Arts and Sciences** conducts research that addresses issues of sustainability, quality of life, and global engagement across the physical and social sciences and the humanities. Research projects include impacts of migration on the environment, effects of globalization on biodiversity and rural communities, climate change-related disease, American Indian sustainable development, and food security.

Faculty in the **School of Nutrition and Health Promotion** established the Healthy Lifestyles Research Center. This center provides a preventive focus for sustainable health care by helping to reduce the impact of chronic, lifestyle-related diseases.

ASU Graduate College every year provides dozens of doctoral students with fellowships to pursue research in areas such as ecology, social justice, health, and bioengineering.

Sustainability Scientists and Scholars are engaged in hundreds of research projects funded by external awards exceeding \$70 million annually. Among these is ASU's national Engineering Research Center for Quantum Energy and Sustainable Solar Technologies, a project supported by the National Science Foundation and the U.S. Department of Energy to accelerate solar energy technologies and expand opportunities for solar education. This center is part of the **ASU LightWorks** initiative, which coordinates light-inspired research at ASU, particularly in renewable energy fields including artificial photosynthesis, biofuels, and next-generation photovoltaics.

Dean's Distinguished Professor of Sustainability Science, School of Life Sciences, College of Liberal Arts and Sciences

Jianguo Wu

Editor-in-Chief, Landscape Ecology

Senior Sustainability Scientist, Global Institute of Sustainability

Distinguished Guest Professor, Beijing Normal University, Chinese Academy of Sciences, Inner Mongolia University



Jianguo Wu (R) has traveled across the globe for his research projects, from Arizona's Sonoran Desert to the grassland of Inner Mongolia. His work examines the relationship between landscape patterns and biodiversity, the ecological consequences of urbanization, and the integration of ecological, social, and economic processes for developing sustainable landscapes.

Wu's research results will help improve the management practices of arid and semi-arid ecosystems, particularly in the vast grasslands of the Eurasian Steppe Region. He is founding director of the Sino-US Center of Conservation, Energy, and Sustainability Science — a joint research center between Inner Mongolia University and ASU.

research

collaborations



The **Laboratory for Algae Research and Biotechnology** is codirected by professors Milton Sommerfeld (L) and Qiang Hu (R), who are researchers and professors in the department of Applied Sciences and Mathematics, College of Technology and Innovation. The team conducts research on algae for use in biofuels, food supplements, and water and air remediation while providing training for graduate and undergraduate students. Their work has already moved from the laboratory to the field with a \$3 million demonstration grant to convert algae to biofuels. It also earned *TIME* magazine's number 11 slot among "50 Best Inventions of 2008."

Sommerfeld's research focuses on algae as a fuel source, algaerelated problems in drinking water supplies, and the aquatic ecology of Southwestern streams and lakes. Hu has spent two decades in basic and applied research on algae including photosynthesis, photobioreactor system design, and mass culture technology for biofuels and bioremediation. In addition to being inventors on numerous patents, the team was recognized as the 2007 Innovator of the Year winner by Arizona Technology Enterprises, the 2009 Governor's Innovator of the Year Academia Award from the Arizona Technology Council and the Arizona Department of Commerce, and the 2010 Arizona Award for Research Excellence by the Arizona Bioindustry Association.



ASU's **photosynthetic bacteria biofuels project** optimizes photosynthetic organisms that grow in transparent tubes to produce a sustainable, high-yield fuel for conventional engines. The tubes can be placed on sunny rooftops or nonagricultural land so they don't compete with food production. Because the bacteria are "fed" carbon dioxide, such as that captured from flue gases in conventional coal-burning power plants, they create a carbon neutral energy source with the potential to replace fossil fuels. Significant progress on the project has led to a \$5.2 million U.S. Department of Energy award.

ASU professors Wim Vermaas, Bruce Rittmann, and project champion, Neal Woodbury (R-L), as well as ASU Professors Roy Curtiss, David Nielsen, and others, span the disciplines of microbiology, chemistry, genomics, and engineering. One of the goals of the collaborative project is to develop special strains of cyanobacteria that will directly produce compounds that can be efficiently converted to a viable replacement for petroleum, both as a fuel and as a key component of industrial products such as rubber.



"We have a great responsibility to advance sustainability in our daily operations — to consistently model best practices for our students and our community. It's imperative for a university that is leading the way in sustainability education to also walk the talk."

Ray Jensen, Associate Vice President for University Business Services & Sustainability Operations Officer, ASU

Solar-panel covered parking lot at ASU West campus

committing to sustainability action

Four critical goals focus ASU's efforts to change behaviors and operations across all units:

carbon neutrality

eliminate or offset 100% of building and process energy emissions by 2025 eliminate or offset 100% of transportation emissions by 2035

zero solid/water waste

eliminate 90% of campus solid waste from the landfill by 2015 reduce water consumption by 50% and eliminate 100% of campus water effluent by 2020

active engagement

achieve 60% engagement with members of the campus community by 2015

principled practice

integrate sustainability practice principles into 80% of campus operations and functions

landmark initiative revolves around the sun

ASU's solar power ranks among the largest for any university in the U.S. ASU has installed more than 14 MW of capacity and intends to expand solar installations across all four campuses to 20 MW by 2020.

Professor, Science and Society, School of Life Sciences, College of Liberal Arts and Sciences

Daniel Sarewitz Co-Director, Consortium for Science, Policy, and Outcomes

Senior Sustainability Scientist, Global Institute of Sustainability

Daniel Sarewitz (R) addresses ways science and technology can better support sustainability. His research in the area of climate science has highlighted the complexities of connecting scientific research to the needs of decision-makers in light of deep uncertainties and political conflict.

Sarewitz is also developing principles and a policy framework for more effective application of technologies to problems of sustainability, with a focus on climate adaptation and energy innovation. He writes a regular column for *Nature*, and is a fellow of the American Association for the Advancement of Science.



The Sustainability Practices Network is a cross-departmental group established to develop ASU's sustainability operations plans. More than 150 people-administrators, faculty, students, and staff—from more than 40 departments across all four campuses are actively collaborating to achieve the university's sustainability operations goals.

leading by example, reducing human footprint

Campus Harvest engages the ASU community in planting and harvesting food from ASU's extensive urban campus, thereby diverting more than 12,000 pounds of waste annually from the landfill.

Paint Diversion Program filters and stirs together odd lots of old paint for reuse on small projects around the campus and the community, in the process eliminating a hazardous waste.



Greening Maroon & Gold is a multimedia campaign that connects ASU's sustainability initiatives through widespread use of a single creative identity. **Green Waste Composting** partners with a local farmer to divert from the landfill an average of 140 tons of ASU landscaping waste each year and then return it as compost to fertilize the Tempe Campus Arboretum.

Ditch the Dumpster provides students the opportunity to donate or recycle clothing, household goods, furniture, and other reusable items, rather than filling trash containers to overflowing. In fiscal year 2011, donors diverted more than 60,000 pounds of usable goods from the landfill.

Professor, Electrical Engineering, Ira A. Fulton Schools of Engineering

Christiana Honsberg

Chief Scientist, Solar Power Laboratory



Senior Sustainability Scientist, Global Institute of Sustainability

Christiana Honsberg focuses on advancing the efficiency of low-cost solar cells and modules for portable applications. In 2007, a team she co-directed set a record for combined solar cell efficiency, achieving 42.8 percent from sunlight at standard terrestrial conditions.

Honsberg currently works to develop cells that can operate at greater than 50 percent efficiency as chief scientist of ASU's Solar Power Lab. She is principal investigator of the Engineering Research Center for Quantum Energy and Sustainable Solar Technologies. Prior to arriving at ASU, she helped establish the Center for Photovoltaic Engineering at the University of Delaware, which developed the first undergraduate degree in photovoltaic engineering.

business practices





Engrained is a café on the Tempe campus that serves locally grown food and sustainable meals made to order, displays information about local farms, and provides tips on ways to incorporate eco-conscious behaviors into daily life.

Campus Metabolism[™] provides an interactive Web tool for examining real-time energy data on campus — by individual building, building type, or the entire campus. Its multiple displays allow building managers and users, researchers, students, and others to understand the relationships among renewable energy production, renewable and fossil energy uses, and energy patterns by time of day, week, month, and year. Campus Metabolism also allows campus users to view the impacts that common devices have on electric bills. The department of Environmental Health and Safety manages a green labs program pioneered by the School of Letters and Sciences on the Downtown Phoenix campus. The program helps lab employees adopt proven practices that cut energy use, avert waste, and reduce biohazard materials.

Professor, The Design School, Herberger Institute for Design and the Arts

Fellow, American Solar Energy Society

Harvey Bryan

Fellow, American Institute of Architects

Senior Sustainability Scientist, Global Institute of Sustainability

Harvey Bryan, standing in the Biodesign Institute building he helped to "daylight" — Arizona's first LEED platinum certified structure — is a specialist in natural lighting, building technology, and renewable energy use in buildings. The American Solar Energy Society named him their 2007 Solar Pioneer for his original work in "architectural daylighting" — the strategic use of natural light in indoor environments.

Bryan served on the board of directors of the American Solar Energy Society and chaired their Solar 2010 Conference. He is certified in U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) building rating system as well as the international Building Research Establishment Environmental Assessment Method (BREEAM).





"We absorb and process what we have learned to figure out how we can create sustainable business opportunities to help people."

Brian McCollow, School of Sustainability Student Class of 2012

Brian McCollow (R) in Ghana with GlobalResolve, a College of Technology and Innovation social entrepreneurship program that works with developing economies on sustainable solutions

inspiring global change, city by city

ASU's Sustainable Cities Network works to advance and implement sustainability as a core value throughout city planning, development, policy, and operations. The Network maintains a community actions database to track and share best practices in sustainability and has active partnerships with cities, towns, tribal nations, and county governments.

The Creative City Certificate, offered through the School of Public Affairs in the College of Public Programs, prepares students to revitalize cities and communities and foster sustainable development.

Applying state-of-the-art science and 3-D visualization, ASU's Decision Theater supports projects such as WaterSim - an interactive decision tool that explores scenarios and strategies for managing water supplies across a range of climate conditions.

Walter Cronkite School of Journalism and Mass **Communication**, through its Cronkite News Service, reports on local and statewide sustainability news for media outlets around the nation.



Director, Center for Environmental Economics and Sustainability Policy

Member, National Academy of Sciences V. Kerry Smith

istinguished Sustainability Sci Global Institute of Sustainabil

Regents' Professor and W. P. Carey Professor of Economics, W. P. Carey School of Business



V. Kerry Smith is an expert in the economic assessment of natural resource damages, the design and evaluation of air and water quality regulations, and transportation and environmental policies. He works collaboratively with research scientists and students on a variety of issues, including a study of the influence of climatic conditions on residential demands for water in the Southwest. He is also investigating how households weigh the economic tradeoffs between the costs of reducing pollution and the health benefits to children and the elderly from air quality improvements.

Smith is a Fellow of the Association of Environmental and Resource Economists and the American Agricultural Economics Association, University Fellow with Resources for the Future, and Research Associate of the National Bureau of Economic Research. He teaches courses on econometrics, public economics, and environmental and resource economics.

engaging locally, nationally, and internationally

The Global Institute of Sustainability offers thought-provoking conversations on sustainability issues throughout the year. These range from small brown-bag lunches with prominent faculty, to signature **Wrigley Lectures** featuring renowned thinkers, to collaborative events with major media organizations such as NBC News, Discover Magazine, and American Public Media.

The **Latin America Office of the Global Institute of Sustainability** is a joint project of ASU and Tecnológico de Monterrey, the largest private not-for-profit university in Latin America. This affiliate of the Global Institute of Sustainability, based in Mexico, is designed to address Latin American sustainability issues through applied transdisciplinary research, a curriculum for training a new generation of entrepreneurs, and a focus on finding business solutions that lead to a culture of sustainability.

The Sustainability Consortium is a joint effort led by ASU and the University of Arkansas to work collaboratively with diverse scientists, businesses, non-governmental organizations, governmental agencies, and others to build a scientific foundation for consumer product sustainability through all stages of a product's life cycle. In 2011, the Consortium expanded its global scope with a European office in the Netherlands in partnership with Wageningen University, a top European agricultural university.

Gilbert F. White Professor of Environment and Society, School of Geographical Sciences and Urban Planning, College of Liberal Arts and Sciences

Member, National Academy of Sciences **B.L. TURNER**

Member, American Academy of Arts and Sciences Fellow, American Association for the Advancement of Science



B.L. Turner II's research addresses global environmental change by examining the interactions between humans and the environment that lead to land change, particularly deforestation and desertification. He is a member of the National Academy of Sciences' Roundtable on Science and Technology for Sustainability and the Scientific Committee of DIVERSITAS.

Turner's ongoing work in the Southern Yucatán Peninsular Region a study of tropical forest change resulting from human interaction with the environment — helped to establish what is now known as "land change science." He teaches courses on land change science, human transformation of the Earth, and cultural and political ecology.

Defining Sustainability the theme of a significant ASU Art Museum exhibit — featured artistic expressions of issues such as how art has influenced human interactions with land and how a "Canalscape" project could upgrade Phoenix's canals by creating sustainable public amenities and economic development hubs.

global impact

K-12 Partnerships with educators and communities bring sustainability education to schools. Among ASU's initiatives:

Ecology Explorers creates opportunities for students from more than 75 schools to collect data from backyards and schoolyards and contribute to ASU's urban ecosystem research.

The **Sustainability Science for Sustainable Schools** program brings together ASU graduate students with high school students, teachers, and administrators to help their schools become more sustainable. Teams assess and address environmental, social, and economic dimensions within each local school to create a more sustainable curriculum, campus, and community.

At the **Modeling Institute**, middle school students learn through computer modeling. This Science, Technology, Engineering, and Math (STEM) education program emphasizes sustainability in its summer college-for-kids programs and offers professional development opportunities for middle school teachers.

Southwest Center for Education and the Natural Environment

immerses high school students in six months of innovative research activity alongside university research scientists in areas such as the effects of water decline on streamside animals, the ecology of Sonoran Desert biotic communities, and the use of nanotechnology in alternative energy applications.



Professor, School of Life Sciences, College of Liberal Arts and Sciences

ellow, American Association for the Advancement of Scienc Ann Kinzig

Chief Research Strategist, Global Institute of Sustainability

Senior Sustainability Scientist, Global Institute of Sustainability





Ann Kinzig focuses her research on ecosystem services, conservationdevelopment interactions, and the resilience of natural resource systems. She is involved in a number of major research projects, including an assessment of ecosystem services, their valuation, and mechanisms for ensuring their continued delivery.

Among Kinzig's other primary projects are a study of the resilience of prehistoric landscapes in the American Southwest and an effort to model human-caused effects in the spread of diseases. She is also a faculty member of the ecoSERVICES Group in the College of Liberal Arts and Sciences.

evolution of ASU's commitment to sustainability

"A central challenge in the 21st century is to help people live better in a world of constrained resources. The customer of the future will continue to expect affordable products, but with higher quality and greater transparency regarding their environmental impacts. Businesses that get ahead of these rising expectations will win in the long run."

-S. Robson Walton, Chairman of the Board, Walmart



GIOS 1.0 recognizing the challenge

Wrigley Lecture Series on Sustainability

world-renowned thinkers and problem-solvers engage the community in dialogues to address sustainability challenges

Select Wrigley lecturers include:

JANINE BENYUS Author and President. **Biomimicry Institute** Biomimicry as a Path to Sustainability

WILLIAM CRONON

President, American Historical Association The Riddle of Sustainability: A Surprisingly Short History of the Future

JARED DIAMOND

Professor of Geography, University of California-Los Angeles Collapse: How Societies Fail or Succeed

JOHN HOFMEISTER

Retired President, Shell Oil Company Why We Hate the Oil Companies

VAN JONES Former Green Jobs Advisor to the White House Beyond Green Jobs: The Next American Economy

ROBERT W. KATES

National Medal of Science Laureate Humboldt's Dream and Sustainability Science

HUNTER LOVINS

President/Founder, Natural Capitalism Solution Doing Business in a World Facing Climate Change

JANE LUBCHENCO

Under Secretary of Commerce for Oceans and Atmosphere Scientific Knowledge Informing Today's Choices and Tomorrow's Ocean

PAMELA A. MATSON

Dean. School of Earth Sciences. Stanford University Saving Land for Nature

WILLIAM MCDONOUGH

Architect and Author Cradle to Cradle Design, Education, and a Future of Abundance

ELINOR OSTROM

Nobel Laureate, Economic Sciences Linking Forests, Trees, and People

ANDREW C. REVKIN

Author and Journalist, The New York Times Dot Earth: 9 Billion People + 1 Planet

CYNTHIA ROSENZWEIG

Climate Impacts Group, NASA Goddard Institute for Space Studies What I Learned in New York and Copenhagen

SIR CRISPIN TICKELL

Former British Permanent Representative to the United Nations Sustainability: The Global Prospect

FRANCES WESTLEY

J. W. McConnell Chair. Social Innovation, University of Waterloo Building Resilience in Socioecological Systems

EDWARD O. WILSON

Research Professor Emeritus, Harvard University The Future of Life

1998 Ecology

Explorers K-12 science program launched

2000 ASU receives more than \$2.5 million to launch IGERT (Integrative Graduate Education and Research Traineeship) in

urban ecology

2001 Lincoln Institute of Land Policy sponsors the Greater Phoenix 2100

2002 Biodesian

Institute created to advance health care, sustainability, and security

Consortium for the Study of Rapidly Urbanizing Regions formed

2003

Greater Phoenix Regional Atlas published as a resource for solving regional issues

2004

2005

Decision Theater ASU President Michael Crow opens with convenes global \$3 million gift leaders in Temozón, from Ira A. Fulton Mexico, to help design ASU's National Center sustainability of Excellence

initiatives on SMART Innovations The Global forms to advance Institute of technology-based Sustainability solutions for established with challenges such as \$15 million gift from urban heat island Julie Ann Wrigley

Decision Center for a Desert City launched with \$7 million NSF grant

Advancing **Conservation in** a Social Context begins research in Tanzania. Peru. Vietnam; funded by MacArthur Foundation

GIOS 2.0

symposium

how do we

now is the time to accelerate our solutions and produce evidence of their impact



School of Sustainability established

Association for the Advancement of Sustainability in Higher Education holds pivotal meeting at ASU

2007 School of Sustainability

enrolls first graduate students

President Crow announces the American College & University Presidents' Climate Commitment

Biodesign Institute Building B earns Arizona's first platinum-level certification for Leadership in Energy and Environmental Design (LEED) from the U.S. Green Building Council

2008 School of

Sustainability enrolls first undergraduate students

ASU hosts corporate, government, academic, and environmental leaders at the **Sustainability** Solutions Summit in Washington, D.C.

Swette Center for Environmental Biotechnology established with a \$10 million gift

2009 School of

Sustainability honors **first class** of graduates

Barrett, the Honors College, opens sustainable living community

The Sustainability Consortium forms in partnership with Walmart, Dial, US-EPA, others to establish

others to establish scientific standards for assessing sustainability of consumer products Energy Frontier Research Center sponsored by the U.S. Department of Energy launches to accelerate a bio-solar fuel energy economy

ASU completes Carbon Neutrality Action Plan to meet the American College and University Presidents' Climate

Commitment

Multidisciplinary minor in sustainability launched, making sustainability education available to any undergraduate

2010

program of study School of Sustainability graduates first Ph.D. in sustainability

Program on Law and Sustainability established to assist corporations, nonprofits, governments meet their renewable energy objectives ASU wins USAID grant to design a new international master's degree in sustainability science

ASU partners with City of Phoenix on **Energize Phoenix**, a \$25 million U.S. Department of Energy project to improve energy

efficiency in the built environment

GIOS 2.0 launching the response

expand global impact

propel ideas to action

empower 10,000 leaders

2011

Quantum Energy and Sustainable Solar Technologies Engineering Research Center established through \$18.5 million grant from NSF and U.S. Department of Energy

ASU-led **Power** Systems Energy Research Center (PSERC) awarded \$5.5 million grant from U.S. Department of Energy to help design the future

ASU surpasses 14 megawatts of solar generating capacity

electric grid

ASU partners with City of Phoenix on \$2.9 million U.S. Department of Housing and Urban Development award to promote **transit-oriented** development

ASU launches sustainability leadership program for soldiers and civilians in the U.S. Army, Army National Guard, and Army Reserve

GIOS 3.0 ... aspirations

10,000 students, soldiers, and working professionals earn degrees, minors, and certificates in sustainability leadership at ASU

School of Sustainability opens sustainability solutions centers on multiple continents; sustainability majors study abroad ASU algae research leads to world's largest commercially viable biofuel refinery

ASU spinoff company produces the world's first high efficiency, sustainably produced solar photovoltaic panels that are

panels that are cost-competitive with traditional energy sources ASU meets carbon neutrality goals

ASU achieves **net positive energy production** through campus renewable energy installations network of sustainability students and scientists help communities worldwide implement clean technologies and create green jobs

ASU's global

151

our world

» 2015 2017 2014 2016 Sustainable Cities Network expands knowledge sharing, training, and best practices for metropolitan areas globally

GIOS 3.0 accelerating the impact

inspiring change: board of directors

Sustainability is a fundamental principle that underlies ASU's learning, research, and business operations. The university has set an ambitious agenda to become a leader in finding and sharing sustainable solutions for a rapidly urbanizing planet.

ASU's mission grew out of a visionary endeavor by President Michael Crow to engage experts and advisors from around the world in rethinking how a major research university must organize and act to address the increasingly fast-paced challenges of the 21st century. The result would be a model for the New American University.

Because of that inspired effort, a number of the initial advisors and others prominently involved with sustainability issues joined the ASU Board of Directors for Sustainability. We collectively recognized that ASU's dynamic energy, entrepreneurial mindset, scale, and collaborative spirit made it uniquely positioned to take on the challenges of sustainability and set a new course.

ASU's first pioneering steps were to establish the Global Institute of Sustainability and the first-of-its-kind School of Sustainability. ASU's sustainability mission, however, transcends conventional boundaries. The Global Institute of Sustainability spans and supports all colleges and units at ASU to infuse sustainability across the university's curriculum, research, and campus operations. Going beyond the campus, ASU extends knowledge and practices to local, national, and global partnerships by connecting scientists and engineers with policymakers and business leaders.

From introducing freshmen to the principles of sustainability to advancing high-impact research, working closely with cities, and demonstrating renewable solutions — such as one of the largest university-deployed solar power infrastructures in the U.S. — the Global Institute of Sustainability articulates ASU's university-wide commitment to sustainability.

We invite you to become part of the solution.

Julie & Wrigley

Julie Ann Wrigley

President and CEO Wrigley Investments, LLC

Co-Chair, Board of Directors for Sustainability at ASU





S. Robson Walton

Chairman of the Board Walmart

Co-Chair, Board of Directors for Sustainability at ASU

ASU Sustainability Research Projects



ASU sustainability research extends globally to all seven continents. Each point on the map represents the location of one or more projects led by ASU faculty.



Global Institute of Sustainability Arizona State University PO Box 875402 Tempe, AZ 85287-5402 480-965-2975 Phone 480-965-8087 Fax

sustainability.asu.edu schoolofsustainability.asu.edu

ENVIRONMENTAL SAVINGS

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| fully grown | gallons | million BTUs | pounds | pounds |

Calculations based on research by Environmental Defense Fund and other members of the Paper Task Force.





