Economic Development Planning, Summary 31

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Title: Positioning Arizona for the Next Big Technology Wave: Development and Investment Prospectus to Create a Sustainable Systems Industry in Arizona

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Source: Battelle Technology Partnership Practice, of Columbus, Ohio, as part of the Arizona Statewide Economic Study

Author: Battelle Technology Partnership Practice


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Summary: By building on its existing strengths, Arizona can become a national and international center for “arid lands livability,” exporting sustainable systems and services around the world. That will mean the creation of jobs and companies in Arizona. This is Phase II of a study that began with publication of Battelle’s Science and Technology Core Competencies Assessment report in 2003. That report identified four technology platforms – advanced communications, information technology, bioengineering, and sustainable systems – at Arizona’s research universities that the state could capitalize on to pursue economic growth.

The sustainable systems platform is the starting point for Phase II, which lays out ways Arizona can become a leader in sustainable systems. One goal is to create for Arizona an international reputation for “arid lands livability,” by creating a new industry supporting global “sustainable development,” which is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Seven strategies are identified for positioning Arizona as an international leader in sustainable systems. They are:

1. Make Arizona the “Water Management Capital of the World.”
2. Harness the sun for power, fuel, food and medicine.
3. Make Arizona a sustainable manufacturing “Center of Excellence.”
4. Establish a national and international image for Arizona as the “arid lands livability” state.
5. Create the business infrastructure for a sustainable systems industry.
6. Sustain and grow university and industry R&D.
7. Develop the workforce talent pool to support the sustainable systems industry.

The prospectus envisions spending $1.25 billion over 10 years for signature demonstrations in technology and commercialization.

**Sectors:** Environmental services and equipment (wastewater cleanup, water purification), pollution prevention and recycling (electronics recycling), renewable energy (solar power, wind power, hydrogen production), energy efficiency (integrated building system, thermal hydraulic engine/pump), sustainable manufacturing, green construction materials (rubber pavement, polymers/plastics, concretes), high-value bioproducts (biodiesel fuel, edible vaccines), and sustainable agriculture and forests (biomass, greenhouse products and wood products).

**Geographic impact:** Arizona


**Major challenges:** Five overall gaps in Arizona’s sustainable systems inventory present challenges for the state. They are:

- **Research and development.** Lack of coordination and collaboration among the state’s research industries and with industry, and university R&D programs in renewable energy and green materials are small. There is no national laboratory in Arizona.
- **Product manufacturing.** There are no manufacturing clusters in the key areas of sustainable systems, including solar power manufacturing. Forest products manufacturing base is in disarray. Sustainable manufacturing is
practiced by the semiconductor industry, but not routinely transferred to other industries.

- **Workforce development.** The universities have few interdisciplinary academic programs to educate graduates for jobs in sustainable systems industry. Weak K-12 system falls short of preparing many students to pursue careers in sustainability.

- **Business climate and infrastructure.** State property tax penalizes business investment in sustainable systems. There is a lack of incubators and special eco-industrial parks that could nurture new companies. Few programs exist to assist entrepreneurs or companies. Business hopefuls have difficulty in securing start-up funds from private investors. There is no central advocate for the sustainable systems industry in the state.

- **Market creation.** Little public awareness of need for and value of sustainable development. Arizona lacks a sustainability image, which hurts companies trying to do business outside of the state. Market opportunities on tribal reservations and in the Arizona-Mexico border region are not being utilized.

**Progress to date:** The study identified three primary, high-level performance objectives. They are:

- Arizona will establish leadership in advanced water management and solar-based manufacturing and service industries and double employment by 2010.
- Arizona will establish at least two centers of excellence for sustainable systems, with one evolving to “national” laboratory status by 2010.
- Arizona will establish a business climate conducive to a flourishing sustainable industry, and institutionalize the “arid lands livability” brand by 2007.

Arizona has made significant progress in building its sustainability sector since publication of this study in 2004. Arizona is the self-described solar capital of the county with more than 100 solar companies operating in the state, including Tempe-based First Solar. The companies provide such services as design, manufacturing, installation and distribution. TUV Rheinland PTL, in partnership with Arizona State University, is the first in the world to offer full-scale photovoltaic testing and certification.

ASU’s Global Institute of Sustainability is a national and international leader in sustainability science with a focus on solutions-oriented research. The institute has had a significant impact on environmental planning, management and decision-making with special distinctions in water, energy, and urbanization and environmental change.

The Bio5 Institute at the University of Arizona also enjoys a national and international reputation, bringing together hundreds of researchers from five core disciplines – agriculture, engineering, medicine, pharmacy and science – to develop
and commercialize new technologies, diagnostics, and treatments. ASU, UA and Northern Arizona University are active in water research. The UA’s Biosphere 2 serves as a center for research, outreach and learning about living systems and Earth’s place in the universe.

The Arizona Renewable Energy Tax Incentive Program is designed to stimulate new investments in manufacturing and headquarter operations of renewable energy programs, including solar, wind, biofuel, and geothermal.

**Major implications:** Arizona has the potential to become a national and international center for “arid lands livability,” exporting sustainable systems and services around the world. That means jobs and wealth for its citizens. Arizona and the Southwest will be a significant market for sustainable products and services. Arizona is in a position to demonstrate the value of integrating sustainable systems across urban and rural communities. The state’s proximity to Mexico offers opportunity for joint programs, as well as a new market to serve.

One-third of the developable land in the world is arid/semiarid, similar to Arizona, which could serve as a model for sustainability and gain access to markets in the Middle East, China, Asia, and South America.

Potential sectors for growth include renewable power, green buildings, wastewater cleanup and recycling, and high-value crops. Arizona’s three research universities are leaders in such sustainable systems as water/hydrology, urban and rural ecological sciences, forest management, and environmentally benign manufacturing.

**Opportunities for alignment:** It will take a sustained partnership among many groups to build a sustainable economy. Arizona should align development of technology with the regulatory priorities of the state, such as water conservation. Arizona should develop outreach agreements with federal facilities in such states as Colorado and New Mexico that could lead to new federal R&D.

With their research programs, the universities can develop and introduce new technologies and products. Industry can be the first market for these technologies and products, and work with the universities. State, tribal and local governments have a big stake in improving or utilizing water, energy, land, forests and the environment. Government also can smartly lower the barriers for entry for disruptive technologies. Economic development groups can work to retain and attract sustainable companies and lobby for programs to train skilled workers.

**Background:** Interest is growing in sustainable systems in Arizona, though the industry is relatively small with 934 companies providing sustainable systems products and services, and employing 24,166. These companies are involved in such areas as environmental services and equipment (628 companies, 19,125 employees), pollution prevention and recycling (106 companies, 1,223 employees), renewable energy (83 companies, 818 employees), energy efficiency (54 companies,
1,462 employees), green construction materials (9 companies, 172 employees),
high-value bioproducts (7 companies, 205 employees) and sustainable agriculture
and forests (47 companies, 1,161 employees).

Despite its small size, sustainable systems provides a good foundation on which
Arizona can grow the industry. Seven niches are candidates for further
development: Energy efficiency/renewable energy, water management systems,
sustainable manufacturing, sustainable agriculture, high-value bioproducts,
sustainable forest products, and green materials.

**Strategies for organizing sustainable systems activities**

Seven linked strategies could position Arizona as an international leader in the
sustainable systems industry over the next decade. They are:

- **Strategy One:** Make Arizona the “Water Management Capital” of the World.
  Actions include creating the Arizona Water Sustainability Consortium
  between UA, ASU and NAU. Launch several signature water demonstration
  projects, focusing initially on wastewater cleanup and desalination.

- **Strategy Two:** Harness the sun for power, fuel, food, and medicine. Actions
  include forming a Solar Center for education, research and outreach,
  developing signature demonstrations on renewable energy, energy efficiency
  in buildings and power plants, and developing a set of policies and incentives
  that will grow the solar-based industry.

- **Strategy Three:** Make Arizona a sustainable manufacturing “Center of
  Excellence.” Actions include developing signature demonstrations of new
  technologies for complete water recycling and developing a green products
  industry based on recyclable and/or natural materials.

- **Strategy Four:** Establish a national and international image for Arizona as the
  “arid lands livability” state. Actions include appointing a state “Sustainability
  Czar,” reporting to the governor, and the Sustainability Council; creating the
  Arizona Sustainable Systems Industry Association; create a “Blue Ribbon”
  panel to recommend changes in local and state standards, codes and
  regulations pertaining to energy and water; market Arizona as a prime
  location for companies manufacturing and servicing sustainable systems.

- **Strategy Five:** Create the business infrastructure for a sustainable systems
  industry. Actions include implementing the recommendations of the
  Governor’s Council on Innovation and Technology for new sustainable
  business creation. Developing eco-industrial parks around sustainable
  industries like high-value bioproducts, sustainable agriculture and forest-
  based industries, and sustainable manufacturing. Attract funding from
  nontraditional funding sources such as private family funds, international
  development banks.

- **Strategy Six:** Sustain and grow university and industry R&D. Actions include
  creating a statewide Sustainable Systems Science and Technology
  Collaboratory that networks scientists and engineers across Arizona.
• **Strategy Seven:** Develop the workforce talent pool to support the sustainable systems industry. Actions include developing a statewide workforce-education strategy for sustainable industry. Increase capacity of higher education to grow its own skilled workers in sustainable systems. Increase the number of teachers who are competent in the use and application of technology in the classroom.