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Eco-economics in Texas: Competitive Adaptation for the Next Industry Revolution

by
John Motloch

Director, Land Design Institute
Ball State University
and Visiting Scholar
IC² Institute
The University of Texas at Austin

J. David Armistead

Principal
Social Web Strategies, LLC

Jon Lebkowsky

Principal
Social Web Strategies, LLC

The global economy within which Texas' businesses operate is shifting rapidly from a context of *resource abundance* to a context of *resource constraint*. In the economy of resource abundance, economic growth is enabled through continuous and accelerating *resource consumption*, while in an economy of resource constraint, growth is sought through continuous and accelerating *resource performance improvements*, (Table 1). This global shift presents a sea change in basic business strategies, as competitive advantage shifts away from traditional linear supply strategies (*production>distribution>consumption>waste*) toward innovative (*non-linear, cyclical*) resource supply strategies that reduce new supply demand through:

- resource performance enhancements
- expansion of existing resource supply through recycling

• sustainable resource supply through integration with resource life-cycles (see Table 2, p. 2).

This new basis of supply is called "eco-economics," a trend that affects all fundamental resources, including energy, water and food.¹ This global shift unleashes a massive and accelerating global demand for eco-economic activity and innovation. In response, global business has already begun to adapt to this shift in conditions, and the speed at which Texas businesses can meet this eco-economic demand could well determine their ability to remain competitive in global markets over the coming decades.

Texas Business Competitive Adaptation

While the current global challenge seems almost without precedent in urgency, it may

Table 1
The Old Economy vs. the Sustainable Eco-economy

	Old Economy	Eco-economy
Resource Premise	Energy and material resources unlimited	Energy and material resources limited
Primary Enabling Technology	Industrial tooling	Digital converged media
Supply Process	Linear (cradle to grave) flow from harvest to use to waste	Life-cycle (cradle to cradle) flow from source to re-source
Action Focus	Resource consumption	Resource performance
Base Economic Activity	Enhancement of labor productivity	Enhancement of materials & energy productivity
Base Business Strategy	Marginal improvements in the linear supply process	Marginal improvements in the cyclical supply process
Operations Base	Harvesting, mining, etc.	Recycling, industrial ecologies, etc.
Capital Base	Physical assets & finance capital	Human/social & knowledge capital

...The immensity of the [eco-economic] challenge is matched by the opportunities it provides for business.

Table 2
Resource Consuming Industry vs. Resource Sustaining Industry

	Resource Consuming Industry	Resource Sustaining Industry
Supply Model	Traditional linear models of supply	Non-linear eco-economic models of supply
Relation to Natural Resources	Consumes resources; produces wastes	Uses resources; allows resource regeneration
Resource Utilization	Inefficiency increases costs	Efficiency reduces cost
Role of Byproducts	Waste requiring mitigation	Food for further production; reduced pollution
Production Model	Linear source-to-waste	Input-output; industrial ecology
Benefit Provided to Market	Products (e.g., sell chemicals)	Services (e.g., provide, use & remove chemicals)
Internal Flow	Move people	Move information not people
Employment	Cheap energy eliminates jobs	Green jobs replace costly energy

be compared to the challenges faced by Texas in the 1960s that resulted in the emergence of Texas aerospace industries; the challenges in the 1980s that resulted in the emergence of Texas high-tech industries; and the challenges in the 1990s that resulted in the emergence of Texas internet industries (Table 3).

Similarly, the immensity of the challenge is matched by the opportunities it provides for business, although the present situation is estimated to vastly exceed any of these prior competitive shifts in both scale and scope. The innovations that are necessary to realize this opportunity include:

- increased capture of manufacturing byproduct outputs (previously considered waste) for use as manufacturing inputs, facilitated by non-linear resource supply systems that utilize input-output (I-O) models and industrial ecology networks
- improved energy and resource efficiency through implementing clean, "green" technologies at initial planning stages of

production and construction

- strategic leverage of critical knowledge, human capital, and financial capital as the meta-basis to initiate these shifts.

Competitiveness in the new global economy of resource scarcity depends on the fundamental transformation of businesses to use more resource- and energy-efficient systems – in operations and in the kinds of products and services that are made available.

Essentially, the challenge is to produce more per unit of resource, and to enable all sectors – business, government and household – to continually derive more performance from each unit of material and energy consumed. New assessments are needed to assure that byproduct outputs are perceived as additional resources for value-adding production, and not as waste. Retaining competitiveness is dependent on sustainable use of resources, and increased partnering with natural systems. New advantages will be seen for integrated technologies and production streams

Table 3
Evolution of Economic Development Strategy in Texas

	Economic Concern	Economic Driver	Business Activity
1970s	Cold war	Military/industrial demand	Aero/space
1980s	Fifth-generation computer	Data processing demand	IT industry collaboration
1990s	High-tech competitiveness	Distributed computing	PCs, Telcom, Dot-com
2000s	Knowledge creation	Internet connect demand	Web-based operations

If Texas businesses are to remain competitive in the new economy of global resource constraint, innovations and adaptations will be required at every scale.

that capture value-adding eco-economic opportunities.

An important element in these fundamental changes is the strategic leverage of a communications infrastructure to facilitate knowledge development, sharing, and transfer – a goal that ultimately has the potential to reduce the need for energy-consuming transportation. This kind of business development and redevelopment will require innovative thinking at pre-ideation and ideation levels, as well as at levels addressed by more traditional incubation models.

Necessity of Eco-economic Initiatives

If Texas businesses are to remain competitive in the new economy of global resource constraint, innovations and adaptations will be required at every scale. There is a great need for integrated development and capacity-building initiatives to support collaboration across academic, business, government, and non-profit organizations.

Successful change will require generation of new knowledge, financial capital, and human capital. We suggest four integrated and parallel initiatives to catalyze the next major wave of growth in Texas business:

- Texas Eco-economic Innovation Initiative
- Texas Sustainability Economy Initiative
- Austin Green Initiative
- Technopolis-Green Initiative.

The Texas Eco-economic Innovation Initiative

The Texas Eco-economic Innovation Initiative (TEII) would help create collabo-

orative industry-university centers to help companies identify eco-economic innovations that could enhance competitiveness in the new global economy of resource scarcity. These centers would provide support operations at the scale of individual organizations and businesses to help implement eco-economic innovation in ways that optimize competitiveness in the new economy. They would support innovation at all levels of business development, from pre-ideation through growth, by identifying potential innovations at all levels of the design process.

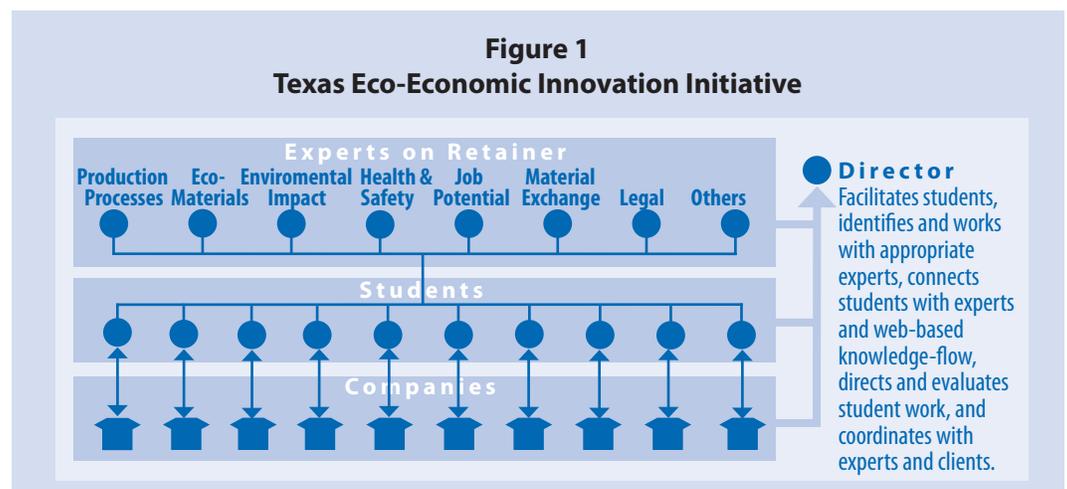
Efforts are already underway to identify partners for the Texas Eco-economic Innovation Initiative (Figure 1). Next steps include a proposal to the Industry-University Cooperative Research Consortium (IUCRC) program of the National Science Foundation to fund eco-economic innovation within the participating partner firms to enhance their competitiveness in the new economic context.

The TEII Center would involve:

- a diverse group of global experts on retainer
- graduate students to work with companies and experts to pursue eco-economic innovation
- Texas business partners from a variety of industries
- a director to oversee operations.

The Texas Sustainability Economy Initiative

The Texas Sustainability Economy Initiative would help the state transform the current challenges into the next driver of Texas



The Dallas-Houston-San Antonio Triangle is an ideal location for the Texas Sustainability Economy Initiative. One of the nation's 13 mega-regions, the Triangle has the unique potential to maximize eco-economic competitiveness.

economic growth on a global scale. This initiative would function across the Dallas-Houston-San Antonio region, referred to as the *Texas Triangle* (see Figure 2, p. 6). The western area of the Texas Triangle, extending from San Antonio north through Austin to Dallas-Forth Worth, is an accelerated growth area and would offer a special opportunity to support successful implementation of eco-economic development. This initiative would work with business, government and education collaboratively to demonstrate the advantages of eco-economic development to:

1. Incorporate byproducts as material for further production.
2. Create efficient industrial ecology production networks.
3. Develop green building and green living products.
4. Develop clean technologies and provision their adoption.
5. Educate executives, scientists, designers, engineers, and other professionals, in eco-economics.
6. Conduct the basic R&D that business requires to generate eco-economic innovation.
7. Develop the new eco-economic skilled workforce.
8. Integrate the processes of society and commerce with the local and global ecology in sustainable patterns of growth and development.
9. Recruit the global 'best of breed' eco-economic firms to locate in Texas.
10. Generate the 'green collar' and eco-economic jobs required to service and support the new global economy.

The Dallas-Houston-San Antonio Triangle is an ideal location for the Texas Sustainability Economy Initiative. One of the nation's 13 mega-regions, the Triangle has the unique potential to maximize eco-economic competitiveness. The initiative would support research into the business environment that is required to accomplish the goals listed above. Finally, a significant purpose of the Texas Sustainability Economy Initiative would be to serve as a model for Texas and the world.

The Austin Green Initiative

The Austin Green Initiative would benefit all of Texas by helping to accelerate its capital city, situated at the heart of the Texas Triangle, into one of the world's leading green cities. In Austin, the new economy is already driving the emergence of whole new categories of green consumers, green business-to-business commerce, sustainable business operations, clean and renewable energy R&D, and socially responsible finance and investment. Texas' leading center for eco-economics, Austin has long been perceived as a global leader in this arena.

This leadership was internationally recognized fifteen years ago, when Austin was the only U.S. city to receive a Sustainable Cities Award at the 1993 Rio Earth Summit. The city's Clean Energy Incubator (CEI) was the nation's first incubator for clean energy companies, and is perhaps its finest, having partnered with the EPA to create and lead the Association of Clean Energy Incubators. Austin is also home to the Center for Maximum Potential Building Systems (CMPBS), one of the world's leading sustainability education, research, and demonstration non-profits. Austin Energy, the city-owned utility, has one of the nation's most successful utility-sponsored green power initiatives, and the city's current mayor, Will Wynn, is a national leader in green and sustainable municipal policies.

With its longstanding cultural tradition of social engagement and high quality of life, Austin has become the center of thought leadership for "green" initiatives in Texas. Austin also has a thriving entrepreneurial community that fosters innovative idea generation, commercialization, and development. For these and other reasons, Austin is uniquely well positioned to increase its international brand recognition to be known as one of the world's pre-eminent green cities, a place where the most advanced green and sustainable businesses and innovative thinkers want to be.

This recognition could be leveraged for further economic growth. The Austin Green Initiative would encourage state and local collaboration to promote the city's role as an eco-economic driver. The initiative would

also exploit Austin's brand position to help secure investment of resources in other areas of the state. It would also focus on all stakeholder levels within relevant business clusters, including grassroots or bootstrap entrepreneurial initiatives, evolving co-working centers, and "idea factories."

The Technopolis-Green Initiative

The Technopolis-Green Initiative would help develop the IT business infrastructure that is required for the state to fully implement and benefit from the other three eco-economic initiatives. In the old economy, the capital base consisted primarily of material resource ownership and development rights, and associated tooling and equipment technology. In the new economy, however, the capital base consists primarily of human and knowledge capital, and associated information processing and communications technology, including digitally converged media and increasingly open and integrated data stores.

The old economy was mediated primarily through the mechanisms of monetary finance. But the new economy is being mediated primarily through the mechanisms of digital networks. These networks functionally engage individuals with diverse interests in simultaneous data processing and communications, which forms continually shifting assemblages of knowledge and human capital production. Converged digital media is therefore the key technology that enables the new economy.

Texas information technology and telecommunications sectors, at both the established and developing levels, can be nurtured and leveraged to augment and amplify the eco-economic gains of the other three development initiatives. To this end, the Technopolis-Green Initiative would engage collaborations statewide to help link the Texas IT, telecom, and internet sectors with government and business in extensive and sustained efforts to lead the world in converged media infrastructure.

This infrastructure, which is essential to compete in the new eco-economy, is both technical and social, and is capable of facilitating collaboration to support a robust entrepreneurial marketplace of ideas and synergies.

Conclusions

The challenge of continually escalating environmental and economic change can be seen as a major eco-economic opportunity if sustainable development, industrial ecology, green products, and clean and green technologies are recognized as an engine for economic growth. In the same way that IT drove the last wave of U.S. economic growth, eco-economic development can drive the next. Such development will be accelerated through converged social media and increased sharing of innovative knowledge.

This opportunity already presents us with a new globally competitive environment, one in which Texas possesses unique and valuable advantages. Texas must rapidly reorient its business sector away from old economic strategies and toward the new demands and requirements of the eco-economy. The initiatives outlined here would help catalyze the transition. The Texas Eco-economic Innovation Initiative would help to usher individual businesses and organizations across the state into the new economy. The Texas Sustainability Economy Initiative would leverage and coordinate the state's five largest urban economies as they marshal new eco-economic development forces in their areas. The Austin Green Initiative would launch the state's "greenest city" into a leading global position. Finally, the Technopolis Green Initiative would develop a world-class digitally converged media infrastructure for Texas. Together, these four initiatives could potentially generate an unprecedented new wave of economic growth and business development for Texas through the new eco-economy.

Further Information

Those interested in obtaining further information or participating in any of the eco-economic development initiatives outlined above should contact John Motloch (765-228-8494; jmotloch@bsu.edu) or J. David Armistead (512-589-3998; darmistead@armistead.be).

Reference

1. Brown, Lester R., "The Eco-Economic Revolution: Getting the Market in Sync with Nature," *The Futurist*, Vol. 36, No. 2, March/April 2002, pp. 23-32.
2. The Sustainability Economy is the economy that provisions a sustainable future. In conditions of resource constraint, it is the more viable economy because it costs less to sustain resources than to rebuild them. ◆

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IC² Institute Director:

John Sibley Butler
john.butler@mcombs.utexas.edu

TBR Editor:

Bruce Kellison
bkellison@ic2.utexas.edu

TBR Managing Editor:

Margaret Cotrofeld
margaret@ic2.utexas.edu

Sales Office:

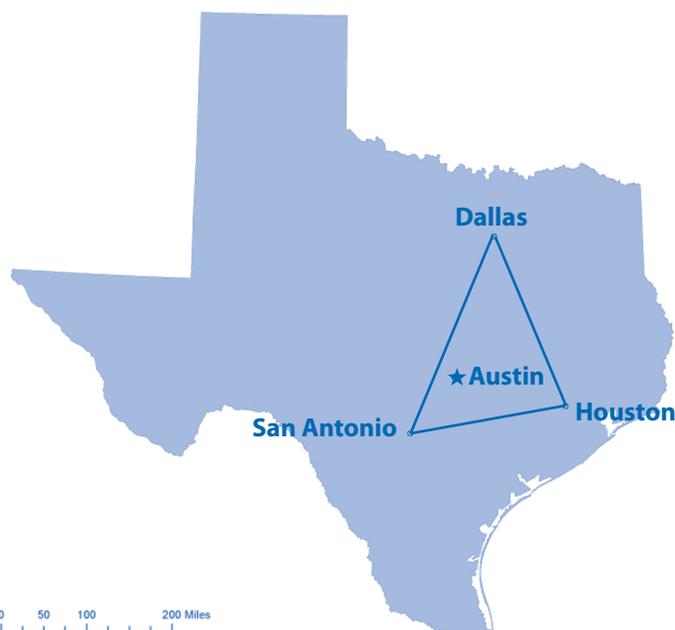
(512) 475-7813
(512) 475-8901 fax

www.ic2.utexas.edu/bbr

The University of Texas at Austin
BUREAU OF BUSINESS RESEARCH
IC² Institute
1 University Station A0300
Austin, Texas 78712

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**Figure 2
The Texas Triangle**



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