

LET'S GROW KNOXVILLE'S GREEN ECONOMY

2013 FORUM REPORT

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EXECUTIVE SUMMARY

This report is based on research conducted by the report authors on the major aspects of the green economy within the greater Knoxville area. Much of the data were compiled as part of a “Green Jobs Forum” attended by about 100 people on March 1, 2013 at the Haslam Business Building on the campus of The University of Tennessee-Knoxville. The forum entitled “Let’s Grow Knoxville’s Green Economy,” included industry representatives, small business owners, community leaders and activists, city officials and managers, researchers from the University of Tennessee-Knoxville and Oak Ridge National Laboratory, and many others. Participants examined the current status of the green economy in Knoxville and shared their views about how they think it might grow. Another major study goal was to identify steps that this diverse group of stakeholders could take to create long-term collaborative partnerships that would work together to increase the diversity and number of green jobs in the Knoxville area in the future.

The findings on research conducted on other cities (i.e., Austin, TX, Chicago, IL, and Little Rock, AR) that have been successful in nurturing their green economies were also presented during the Green Forum. In addition to the above research, this report relies on data obtained from the Brookings Institute’s (2010) *Green Jobs Assessment Report*, as well as a variety of other sources. The following “2013 Forum Report” provides a background of the green economy related to the twin problems of environmental degradation and deindustrialization, defines the green economy, and then summarizes our major findings.

The Green Forum and our research were generously supported by Provost Susan Martin, Institute of Agriculture-Dean Bill Brown, College of Arts and Sciences-Dean Theresa Lee, the College of Business Administration’s Anderson Center for Entrepreneurship and Innovation’s -Associate Dean Alex Miller, and the Bredesen Center for Interdisciplinary Research and Graduate Education’s Director Lee Riedinger of the University of Tennessee-Knoxville.

Summary of the Findings by Major Area Identified at the Green Jobs Forum

Coordination

- The local green economy must diversify beyond energy without ignoring strengths in that area
- Multiple dimensions of economic growth require coordination
- Goals of diverse sectors need some alignment

Community

- We must make a more green community to attract the green economy
- Education is crucial
- Needs of specific communities must be addressed, including the poor and business communities
- Media must play a more active role

Government

- Strong governmental leadership is required at all levels
- Regulations are crucial; coding, mandates, etc. create markets, change values, and provide possibilities of punishing non-compliance
- Governments provide necessary grants, subsidies, and incentives
- Collaboration among governmental leaders is necessary, despite political differences
- From bricks and mortar and beyond, to infrastructure and retrofitting, to grants for projects to setting standards, governments play indispensable roles

University of Tennessee-Knoxville

- UT must take the lead in educating citizens to sustainable values, students and others in new job skills and career options, and industry about research and commercialization possibilities
- UT must serve as convoker and coordinator of very different constituencies involved in the local green economy
- UT must serve as an information gatherer and clearinghouse
- UT must forge a variety of partnerships with actors both internal and external to the institution

Other Actions Needed

- Continue mapping the full breadth of Knoxville's Green Economy
- Talk further with UT stakeholders in environmental research
- Form Advisory Council from industry and community actors active in March 1 forum
- Continue research on other local green economies, and on universities' roles in economic development
- Consult with City of Knoxville regarding how UT can complement the City's efforts
- Talk to UT administrators about institutionalizing the Green Initiative

Introduction

This project situates itself at the intersection of two social problems. The first is a global problem with national manifestations. Widely speaking, that first problem is globalization, and nationally our focus is on deindustrialization. The second is a global problem with manifestations in every locale and impacts on every living being, environmental degradation. We ask the question, how have others begun to find a common resolution to these intersecting problems? Can we pursue that strategy in the Knoxville area? The common resolution to which we refer is the emergence and nurturing of a green economy. The significant presence of the green economy already existing in Knoxville leads us to a final question: what can the University of Tennessee-Knoxville (UT), as an educational institution, a central economic development actor, and as a major player in environmental research, do to nurture the green economy?

This report is a fruit of the March 1, 2013 forum entitled “Let’s Grow Knoxville’s Green Economy.” At that forum, about 100 industry representatives, UT and Oak Ridge National Laboratory (ORNL) researchers, community activists, city officials, and others came together to examine the current status of the green economy in Knoxville, and think about how it might grow. For this report, we generated and analyzed data from 13 different focus groups. Additionally, we conducted case studies on cities (i.e., Austin, TX, Chicago, IL, and Little Rock, AR) with successful experiences in nurturing their green economies. In addition to the above data, this report relies on data found in the Brookings Institute’s (2010) *Green Jobs Assessment Report*, as well as a variety of other sources.

This report begins with a short discussion of deindustrialization and environmental degradation. From there, we define the green economy. We then turn to the focus group data, which is extensive and wide-ranging. For the purposes here, we report on the role of government, the need for coordinated planning, the role of UT, and bridges and barriers to the expansion of Knoxville’s green economy. In

general, we focus on how forum participants articulated what they saw as necessary to build the local green economy and the role that UT might play in resolving those needs.

Background

Deindustrialization in the United States

One of the clearest manifestations of globalization in the United States has been deindustrialization. Driven by cheap labor, lower worker and environmental standards, cheaper transportation, better and faster information technology and subsequent communication, US industrialists moved to increase production abroad rather than re-build national manufacturing capacity. These choices had far-reaching and negative consequences for US workers.

Since the beginning of the deindustrialization trends in the mid-1970s, good employment opportunities previously found in the manufacturing sector of the United States have diminished substantially. Manufacturing employed approximately 28 percent of all workers in the early 1950s; by 2008 that had declined to approximately 12 percent. That figure has continued to drop; by 2011, manufacturing as a job provider has fallen to 8.9 percent of the work force (Mishel, Bivens, Gould, and Shierholz 2012). The service jobs that replaced those manufacturing jobs are largely much lower paying and less secure. In Tennessee, non-farm manufacturing jobs totaled 493,000 in 2000; by 2010 that number fell to 297,800 jobs (Murray 2012).

Deindustrialization resulted in significant wage declines. Real hourly compensation of the median worker rose just 10.7 percent in the period between 1973 and 2011, and most of that increase occurred in the late 1990s (Mishel, Bivens, Gould, and Shierholz 2012). Other related trends have been similarly harmful: job security for working families, provided by the presence of good jobs, has shrunk across the country, and the pensions and benefits associated with good manufacturing jobs have

diminished. Additionally, the jobs effected by deindustrialization have widened. Until the 1990s, traditional blue-collar jobs were those that shrank, but during the 2000s the trend began to hit white-collar, college-educated workers.

Environmental Degradation

The environment has degraded substantially. Every year, 27,000 species are lost (World Bank 2010), 2 million premature deaths result from air pollution (World Health Organization 2008), 1.7 million people die from water pollution (Clarke and King 2004), soil erodes 10 to 40 times faster than it is replenished (Lang 2006), and 13 million hectares are lost to deforestation (Food and Agricultural Organization 2010). Additionally, if trends in fossil-fuel consumption continue, carbon dioxide and other greenhouse gas emissions will continue to rise and the effects of climate change will be devastating (Lester and Hart 2012).

As societies have grown more global and interconnected, so has their ecological footprint. This growth has altered the way in which environmental problems need to be addressed. Small, localized solutions are largely ineffective in addressing regional and global environmental problems. Additionally, manufactured risks (i.e. risks derived from advancements in science and technology) have created new uncertainties, which cannot be resolved using past experiences (Giddens and Pierson 1998).

The “Whats and Whys” of the Green Economy

In 2010, the Brookings Institute defined the green economy as “the sector of the economy that produces goods and services with an environmental benefit” (p.6). According to the Tennessee Department of Labor, the green economy encompasses the “economic activity related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy”

(Knoxvillenews.com 2011:1). At our forum, we used the following definition, “the sector that manufactures, designs, and consults on materials, products, and services that pose less environmental damage using a less damaging production process than traditional products and production processes.” For the purposes of this project, it is also important “to link the idea of green jobs with *decent* employment opportunities: jobs that pay at least a living wage, and offer career ladders, training opportunities and some measure of security” (Pollin and Wicks-Lim 2008:4).

It is this more inclusive definition and the implications of the green economy that may provide the resolution to the problems identified above. The green economy adds higher paying manufacturing jobs while simultaneously reducing environmentally unsustainable practices. This emerging sector of the economy has significant growth and development potential in the 21st Century due to a variety of reasons. One is the increasing recognition of the damage incurred through traditional forms of production. Second, foreign markets are limiting their imports to products with lower levels of toxicity in content and production processes, which promises an expanding market. For example, the European Union has set increasingly stringent environmental standards for products from automobiles to cosmetics, as well as the processes by which such products are manufactured. Third, higher petroleum prices increase the costs of a variety of manufactured goods; this trend will widen the market for products based on alternative technologies. Fourth, the green economy provides broad occupational possibilities – green production requires blue-collar manufacturing labor as well as white-collar designers, engineers, and researchers. Fifth, public opinion polls (see, Center for American Progress 2012) confirm that protecting the environment is a desire shared by a large majority of Americans and that they believe these efforts will improve economic growth and provide jobs. Finally, higher wages will allow workers to actively participate in a market that will drive such production and as their incomes rise, so too will the demand for green products.

The Brookings Institute conducted the first systematic study of regional green economic development and in 2010 published their report, *Sizing the Clean Economy: A National and Regional Green Jobs Assessment*. According to the Brookings Institute, the Knoxville metro area has the second highest share of green economy jobs, totaling 16,135 and comprising 4.9 percent of total jobs (1010, 26). Additionally, the Knoxville area's green economy has the highest annual growth rate in the nation, averaging 14.6 percent between 2003 and 2010 (Brookings Institute 2010: 28). Despite this growth, Knoxville has one of the least diversified clean sectors in the nation, largely due to the presence of ORNL, which fueled the growth of the Knoxville area's professional energy sector. Whereas most large metropolitan area's green economy jobs are green-collar occupations that offer moderate wages and have moderate educational requirements, the Knoxville area has the highest percentage (34 percent) of science and engineering-related occupations (Brookings Institute 2010: 29). Table 1 offers a comparison between Knoxville's green economy jobs with other major US metropolitan areas.

Table 1. Statistical Comparisons Between Knoxville's Green Economy (GE) Jobs and other US Metropolitan Areas

Metropolitan Area	GE Jobs 2003	GE Jobs 2010	GE Share of All Jobs (%)	GE Jobs Requiring High School Diploma or Less	Average Annual GE Wage
Albany-Schenectady-Troy, NY	4,355	5,445	1.7	46.4%	\$38,120
Austin-Round Rock-San Marcos, TX	10,107	14,554	1.9	38.9%	\$40,441
Chicago-Joliet-Naperville, IL	61,659	79,388	1.8	45.3%	\$42,816
Knoxville, TN	6,206	16,135	4.9	28.1%	\$45,184
Little Rock North LR & Conway, AR	5,916	11,934	3.4	47.7%	\$33,857
USA 100 Largest Metro Areas	1,276,388	1,705,897	1.9	43.6%	\$43,133

(Source: Brookings Institute 2010)

Growing the Green Economy

Motivations

Why did approximately 100 researchers, government workers, utility officials, industry leaders, community organization activists, and others join together for this discussion? A classification and summary of the motivations expressed by these participants of the Green Forum are presented below in Table 2.

Table 2. Expressed Motivations for Growing Knoxville's Green Economy

Motivation	Count*	% Sessions**
Aesthetics	1	8.3
Environmental Health	15	41.7
Ethics	1	8.3
Future Generations	3	16.7
Greening/Creating Jobs	28	75.0
Human Health	12	41.7
Incentives	10	50.0
Justice	8	41.7
Local Development	19	58.3
Money	62	83.3
Quality of Life	5	33.3
Personal Satisfaction	9	33.3

*173 total

**11 breakout sessions were included in the analysis

Table 2 displays the various motivations participants expressed for their interest in growing the green economy. Among the least expressed motivations were aesthetics, ethics, and future generations. Environmental and human health concerns were brought up in about half of the breakout sessions (41.7 percent). Participants expressed concern over a myriad of environmental issues, including air quality, climate change, energy security, food security, pollution, and water security. The second most common reason participants gave was greening or creating new green jobs. Greening or creating green jobs was cited 28 times and brought up in 75.0 percent of the breakout sessions.

The most commonly cited reason for interest in the green economy was money. Money, as a motivation, was brought up 62 times in nearly all breakout sessions (83.3 percent). Many of the discussions were centered on money saved from reducing energy use, profiting from expanding recycling, and capitalizing on the financial incentives available for investing in green technologies. Participants also stressed the necessity for green businesses to be profitable.

Green Economic Growth

To grow the Knoxville area's green economy, participants expressed the need for the area to be attractive to green businesses. Participants saw the area's quality of life as crucial to luring green businesses, emphasizing the need for good recycling facilities, public transportation, and green spaces. A green economy, it appears, requires a green community. Participants suggested that both businesses and the employees would benefit from a greener living environment. By increasing the area's quality of life, employees are healthier and more productive, and businesses can save money due to reduced healthcare costs.

Participants also emphasized the need for strong government leadership. In particular, participants saw the need for a strong state vision that would turn Tennessee into a hub for green economic development, to not only help attract prospective business but also to help keep existing green business in the area. To create a more friendly business environment, it was suggested that government develop more expertise in green business lending and to invest more heavily in renewables, infrastructure, and education. Some suggested that education, for both students and consumers, could serve as a catalyst for market growth, which would then be attractive to prospective businesses. Many participants saw a great deal of potential in creating a strong state vision that would foster growth. Participants emphasized the area's unique resources (e.g., ORNL, Tennessee Valley Authority (TVA), UT). In particular, TVA's Sustainable Communities Initiative, which promotes community competition

to be green, was described as very attractive to green businesses. Participants also saw Tennessee's strong energy sector as an asset.

Although participants saw attracting businesses crucial to green economic growth, they also cautioned against large corporations thwarting small business development. Participants expressed concern that attracting many large corporations to the area would lead to industry consolidation, making it more difficult for small businesses to both enter and survive the market.

Growth Through Diversification

Participants acknowledged the lack of diversification in Knoxville's green economy, a perception that confirms the Brookings Institute's (2010) research. They identified the heavy concentration in energy efficiency and production as problematic. Participants suggested that diversifying from a core product could spawn market growth. The biofuel industry was lauded as an example of how product diversification was a catalyst for industry growth. For example, biodiesel, cellulosic ethanol, and carbon fiber are some of the biofuels currently being developed by UT and within the greater Knoxville area.

Others suggested the area must attract more businesses interested in the well-educated youth coming out of UT and the technology being researched and developed in ORNL. While recognizing that both UT and ORNL are heavily invested in the energy sector, participants pointed out that both entities offer plenty of other specializations that could be emphasized. For example, ORNL also specializes in biology and supercomputing, and UT has over sixty research centers and institutions. Participants also suggested that attracting businesses interested in the resources the area has to offer would create jobs that might curb the drain of highly skilled and educated people from the area.

Participants consistently emphasized the need for coordinated planning (see more of this discussion below), and that coordinated planning requires assessing cross-sector impacts. While

admitting that cross-sector impacts are often difficult to predict, participants saw it as essential to understand how sectors interact and affect residents' quality of life. Participants pointed out that although diversification is a key driver of green job creation, it could also cause job loss. Participants saw it important to look at green growth across all sectors and to be reflective while trying to diversify.

Governments in the Green Economy

What is the role of the government in contributing to the green economy? Our data addresses current government activity, and how government might nurture a green market. Perhaps the most important work that government can accomplish is the contribution to new values.

Values and Mandates

Our participants voiced the need for governments to convince the public that regulations driving better environmental standards are in the national interest, and that mandatory standards for clean production and products benefit everyone. Comments that the government should mandate producers' and consumers' behavior were strikingly consistent. Mandatory standards inform both customers and business owners on the importance of green production. Some mandates provided industry and others with incentives to create products. Additionally, participants positively regarded a variety of policies such as providing Property Assessed Clean Energy loans and tax credits for both producers and consumers. Our participants also emphasized that government could help establish new values, reinforcing the green economy by changing building and other development codes as an education process.

Current Government Activities

Discussion prioritized the kind of policies government currently enacted to help generate support for the green economy. Several spoke about how government investments drive the production of new

green technologies; even more spoke about how government incentives nurtured the creation of new technologies.

Collaboration between governments, private industry, localities, and other actors was also seen as crucial to building the green economy to its current position. Multiple government agencies were noted as playing important roles, from federal cabinet-level agencies, to local and state governments, to quasi-governmental actors such as TVA.

Participants agreed that government grants were also crucial. Grants were seen as responsible for driving the solar energy market and bringing different actors together for collaborative writing and subsequent work; the National Science Foundation's focus on funded projects requiring a public communication component was also mentioned.

The activity of government also brought criticism, especially that of TVA. Some questioned TVA's commitment to energy prices and efficiency, especially given its function as an energy provider. In addition, government action was seen as inconsistent, making planning difficult without guaranteed access to resources. The competition for resources was similarly seen as negative, as were the expiration of incentives. Participants criticized the lack of large grants and their overly specific definitions.

Advocating for More Government Activity

Despite some skepticism of current government activity, there was widespread agreement that more government leadership and support could achieve even greater growth for the green economy. Participants suggested governments move to wide efforts that pose the potential of aligning multiple interests. Others argued for more taxes on polluters and increased penalties to change corporate behavior. Specific suggestions included mandated energy audits, micro-loans to consumers, higher rebates for buying green materials, applying green standards to Section 8 housing, depreciation

allowances, speeding up permit approvals for those using green technologies, and incentivizing green practices. Still others suggested that TVA's "Generation Partner Program" be given more public attention and priority. Finally, many complained that Tennessee lacked incentives for fostering the green economy, noting that the state should facilitate investments.

Government and Market

Our participants were nearly unanimous in their recognition that government action essentially created a market niche for green production, and how important that was for their sectors. They relied on government action to create, nurture, and maintain markets. Indeed, the many comments that focused on the positive impact of mandatory standards can all be understood this way. Government grants opened up market niches for a variety of environmental business; others were driven by federal regulations. Reliance on government activity went well beyond those involved in the state university and the national laboratory. Other sector representatives cited collaborations with local governments, and the creation of codes and regulations nurturing their activities.

In this area also, government presence was criticized. The availability of grants had the unintended consequence of businesses following grant cycles rather than some other schedule. Additionally, government had not come to terms with some of the cyclical labor needs that some businesses experienced. Despite these criticisms, the recognition of governments' roles in creating the green economy was overwhelming. Most found government indispensable to the emergence and growth of the green economy.

Coordinated Planning for the Green Economy

As the previous section made clear, the role of governments in the green economy, both in its current and future state, is crucially important. Participants noted the substantial importance of some

element of coordinated planning. According to many of them, growing markets *demand* coordination and planning. They also emphasized the need for coordinated efforts among leaders in government and industry, especially in the area of energy.

The discussion of coordination was a more explicitly political topic than others, including those about the role of government. These comments were both general, and targeted at certain actors who were not seen as always playing a constructive role. One political challenge noted was the need to align goals among diverse actors such as TVA, local governments, nonprofit organizations, and the Chamber of Commerce. Many voiced the importance of coordination among diverse actors because green growth, according to these comments, involves everyone.

Participants also suggested that responding to this challenge would have important implications for securing resources to build the green economy. Some suggested that greater planning could result in better grant proposals and bids submitted for government funding. Others saw business-government partnerships as especially important to the creation and renovation of infrastructure; in particular, infrastructural change was seen as providing great potential for green economy expansion. Finally, others pointed out the value of having an educated public and articulated the need for more coordinated efforts for increasing public awareness, norms and support for growing the local green economy.

Bridges and Barriers to Knoxville's Green Economy

Poverty and underemployment were seen as significant barriers to green economic growth. Participants suggested that developing apprenticeship and internship programs were potential bridges to sustainable solutions: apprenticeships provide the apprentice with a living wage *and* training; and internships address the need for universities to better provide students with skillsets directly applicable to work environments. Participants also spoke of the need for a mentorship program, for both students

and older adults, to help identify pathways into green jobs. This includes not only providing information on educational, training, and employment opportunities but also promoting awareness about the diversity of green jobs that exist.

Many people spoke about the difficulties impoverished communities have in gaining access to affordable energy. Many of the area's residents reside in energy inefficient homes, resulting in high utility bills. Some spoke of the antagonistic relationship between impoverished communities and local utilities. Low-income consumers were depicted as expecting utilities to have the responsibility of providing affordable energy, and utilities were depicted as blaming the consumer for irresponsible energy consumption. Participants in the financial sector spoke of the difficulties in providing impoverished individuals with loans to retrofit homes; the return on investment (ROIs) is simply not high enough, and the loans are too insecure. When it comes to high utility bills, impoverished communities seem to be stuck in a rut: residents cannot afford the retrofits needed to reduce high utility bills, utilities are not accountable for providing the means to lower bills, and financiers will not provide the needed loans because the ROIs are not attractive.

Participants also saw problems in the area's limited transportation system for both poor communities and businesses. For businesses, more advanced and expansive transportation systems permit greater efficiency for shipping and receiving products and transporting employees and customers to and from their facilities. Additionally, lacking public transportation to Knoxville from McGee Tyson Airport makes it difficult for flying in clients for business meetings.. As for poor communities, local transportation costs are prohibitively high or unavailable. High transportation costs affect everyone, but with virtually no access to public transportation, mobility is exceedingly difficult for rural residents. While acknowledging these problems, participants from the transportation sector stated that extending transportation systems to Maryville and Oak Ridge would be too expensive; instead, participants

suggested a dialogue about transportation challenges and realistic solutions between mid-size and major employers.

Many participants saw community empowerment as a catalyst for green economic growth, but found the region's overemphasis on individualism a barrier. For example, some of them expressed concern that the emphasis only on individual and his or her success or failures thwarted cooperative activities, especially among regional leaders with conflicting political views and values. Many desired a more community-and team oriented approach and culture that they feel would promote more green and sustainable economic development.

Participants suggested that aligning green economy efforts more closely with media efforts could encourage community cohesion. Participants thought the media could better cover green achievements in the area (e.g., the convention center getting the Leadership in Energy and Environmental Design certification, the mayor receiving the 2012 US Green Building Council Green Leader award, and Knoxville becoming an Earth Hour City Challenge participant with the World Wildlife Fund). Some participants thought the community would benefit from hearing more messages that emphasize the importance of collective action. Media coverage of success stories would encourage cooperation in growing the green economy.

Participants were clear, however, that a greater sense of community could not be imposed. Participants stated that change needed to come from community members themselves, requiring self-awareness and more cooperation among diverse community leaders. Through this cooperation, communities could become empowered. Participants saw solutions to problems imposed from outside the community as undermining efforts.

The Role of UT in Growing the Green Economy

Our case-study research demonstrates the crucial importance of a variety of actors in a number of successful efforts at building green economies. This led us to ask what kind of role UT could play in nurturing the local green economy.

“Actually” Helping the Communities

The occasionally troubled relationship between UT and Knoxville was perfectly encapsulated by the use of the word “actually” by several participants. *Community*, of course, has many different meanings and contexts. For example, members of various community organizations who were training low-income youth to do retrofit work thought of their community much differently than did consultants and industry leaders. Community organizations focused on the University providing training and financing of projects which would provide work for low-income families. In contrast, the business community was interested in how the University could provide consultation for small businesses in the green economy. The ORNL link was especially important for those interested in the commercialization of new technologies – the “D” of Research and Development (R&D) was often criticized as being insufficiently addressed. These comments prioritized the need for greater information and demonstration of new products and processes. Participants advocated that the University serve as an information clearinghouse, but also provide expertise and consultation on needs from technology to management. Other participants thought that UT and ORNL could do much more to push the commercialization of their research products in a variety of ways, including product and process showcases.

Further discussion suggested bridging the gap between research and industry at the R&D stage by following the current forum with one focused on bringing researchers together with industry. Other participants praised ORNL’s entrepreneurial leave program and suggested it be more widely adopted to

better align the interests of those doing research and the commercialization efforts of industry. The forum itself was praised, but also held up as an indication of collaborative planning and partnering that was an unusual but highly desired contribution by the University.

Bring Together Multiple Actors to Collaborate

The very activity of the forum was seen as a potential but critical function for UT. Comments raised not only the convoking authority of the University, but its physical space and legitimacy as resources that could bring together business, local governments, regulators, community organizations, labor, planners, and educational institutions of all sorts. Participants recognized that many of the attractive jobs in the green economy did not require college educations and advocated that UT also partner with other educational institutions, such as K-12 schools and community colleges, in order to help provide a skilled workforce.

Education

The traditional role of universities, of course, is education. Forum participants encouraged the University to think widely about education. For many, part of that educational role was, as previously mentioned, to train potential workers into job skills and provide an educated workforce. But the University was also called upon to educate consumers about sustainability. Many suggested educating college students about sustainability as consumers and as career options, and advising college students to find internships to ready them for the green job market. Criticisms of UT's educational mission involved discussing UT's on-again, off-again service learning initiative, especially regarding bringing some aid to low-income communities.

One of the most widely endorsed comments was the need for UT to accomplish the hardest task of all – to provide resources and funding to help grow the green economy. The wide resources needs were coupled with the recognition that neither state, federal, nor university resources were likely to be

sufficiently plentiful to resolve varying needs of business, community organizations, and local government.

Conclusion

The commitment of forum participants to talk through the issues raised in this report was notable. Approximately 100 people from diverse sectors participated, many staying for the full day, while others could only get away for half a day. Where does this discussion leave the University of Tennessee? We return to one of our guiding questions, what can the University of Tennessee, as an educational institution, a central economic development actor, and a major player in environmental research, do to nurture the green economy? The answers below suggest some traditional roles of universities, but add many that go beyond a current comfort zone.

Perhaps the most comfortable role that the University can play is that of educator. Even here, however, we need to think about a wider definition of education than that which we think of traditionally. Consultation with business, training lower skilled communities, commercialization of knowledge for greater implementation of new technology, all fit within this wide definition. So too does understanding that education is not aimed just at career readiness and learning of new skills, but also instilling new values, including the planetary requisite of sustainability. In general, the University must increase its function as an information clearinghouse. Education must be thought of as molding consumption, creating markets, and providing skills to many beyond our traditional constituencies. We must seek more opportunities to share communication, whether in more forums or through programs, that institutionalize contacts across sectors.

To play a role in nurturing the area's green economy, the University must advocate and coordinate. Advocacy may seem too directly a political function, but it is clear that markets alone

cannot achieve the green economy. How to advocate from the University is a skill that we need to take seriously and develop.

The University must take on the role of coordinator among industry, researchers from UT and ORNL, local governments, other educational organizations with career tracks, community organizations, disadvantaged populations, and even the weakest local player of all, organized labor. This requires us to take on the engagement role that is currently being advocated by some in the administration, but to achieve this work requires engagement among a wide set of sectors. Those we must work with include those we do not often think about when we think of outreach – the list above, certainly, but also those even harder to organize, ourselves. The need is great for collaboration among many actors, and UT has the local reach and strength to fulfill this role.

But talk alone, research alone, outreach alone will not help push the green economy. We need projects defined by their real and concrete outcomes. Bricks and mortar, real outcomes are necessary to clean the environment while building an economic sector that provides more and better jobs. The need for bricks and mortar is consistently advocated by our keynote speaker, Joel Rogers, probably the greatest expert in the multiple facets of the green economy in the United States. As we build and retrofit the various spatial requirements of the University, we will find a variety of projects that provide real opportunities to build the green economy.

Green economic change is, of necessity, a multidisciplinary effort. Engineers and other scientists are crucial to the enterprise because of the technological resolutions they can bring to the problem. Business and business schools are important to help develop new businesses and jobs. And government, we have seen, is crucial for all stages. But, the issues raised in the forum, our report, and in our research cannot be seen as strictly technological. The need for advocacy and assessment can be fulfilled by social scientists. Social scientists are skilled at convoking people, listening to them, analyzing what they

say, and helping others understand different perspectives. The University must play a coordinating role in nurturing the local green economy, and social scientists, as well as other diverse actors, are crucial to that role.

But this role cannot be an ad hoc effort. The kind of program our data suggests requires institutionalization by the University. The questions of where that institution is built, and with what resources is one of the many tasks to which we must turn if we are to lead Knoxville's green economy.

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