

**NORTH CAROLINA'S ENERGY FUTURES:
REALIZING A STATE OF OPPORTUNITY**

A PROGRESS REPORT ON NORTH CAROLINA'S NEW ENERGY ECONOMY

INSTITUTE FOR EMERGING ISSUES

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Who we are

The Institute for Emerging Issues (IEI) is a public policy, think-and-do tank that convenes leaders from business, nonprofit organizations, government and higher education to tackle some of the biggest issues facing North Carolina's future growth and prosperity. Through research, ideas, debate and action, we prepare leaders to address North Carolina's future challenges and opportunities. North Carolina has long been a model state in the Southeast, with a legacy of forward-thinking leadership and effective collaboration. IEI seeks to mirror and encourage these values, serving as the premiere, university-based public policy organization.

What we do

IEI brings timely focus to identifying and promoting distinctive opportunities for clear and current public policy responses. Our unique public policy process frames future challenges for the state by identifying and researching emerging issues in areas that relate to growth and economic development, relying heavily on outcomes of authentic debate among diverse groups of stakeholders. Programs of work address challenges in interrelated issue areas that represent the foundation of the state's vibrancy and that if not attended to will prevent North Carolina from realizing its potential. These areas of focus include: education, healthcare, economic development, energy and the environment, and tax and finance.

A Progress Report on North Carolina's New Energy Economy: Executive Summary

Our economy is undergoing fundamental change: due to rising energy prices and increasing environmental costs, the United States must now begin the long and arduous transition to new, renewable sources of energy and much greater levels of energy efficiency. This transition will be especially difficult for North Carolina because of rapid growth and limited energy alternatives.

But these changes also present important opportunities, especially for states and regions that move early and aggressively. North Carolina must be one of these leaders.

IEI's Energy Program of Work

The IEI energy program of work identified opportunities created by the new energy economy and defined the regulatory, financial, workforce and business strategies required to sustain it.

The analysis and debate fueled by IEI's model policy process focused on five critical foundations for success:

- Improving energy efficiency in buildings
- Reforming the utility regulatory environment
- Recruiting and sustaining new energy businesses
- Developing a green workforce
- Creating financing options.

Innovative practices already exist in all five of these areas:

- All new state buildings must now be designed, constructed and certified with greater energy efficiency;
- North Carolina's renewable energy and energy efficiency statute uses "renewable energy certificates" (REC) to increase the flexibility and reduce the cost of regulatory compliance;
- A Green Business Fund has been established by the General Assembly Session to provide grants to encourage the growth of a green economy;
- The North Carolina Sustainable Energy Association has begun implementation of their workforce development program to assess workforce shortages and knowledge gaps in the area of building sciences and the solar industry; and,
- North Carolina's renewable energy tax credit – one of the best in the nation - is helping to finance renewable energy system installations.

A complete listing of progress along each of these dimensions can be found in the report's scorecard section. Meanwhile, IEI's Energy Leadership Group will continue to monitor further progress.

Public Policy Process Going Forward

In Fall 2008, IEI, along with North Carolina's regional economic development partnerships and the North Carolina Cooperative Extension Service, will hold a series of Regional Energy Forums to explore ideas for creating and expanding jobs and businesses locally.

IEI has also created a Business Committee on Energy (BCE) to foster debate among the business community so that they are prepared to embrace change and support new policies and practices adopted by state and local government.

Conclusion

A "new energy economy" is upon us and the time has come to act is now. While the state has taken significant steps in the right direction, much more needs to be done. IEI will continue to collaborate with local business and state leaders to generate new ideas for the creation and expansion of jobs and businesses in the future.



"Green is the new red, white and blue."

*Thomas Friedman
The New York Times*

Why Energy? Why Now?

The world's economy is on the threshold of a titanic transformation in the way we produce and consume energy. For two hundred years fossil fuels — coal, oil, and natural gas — have been indispensable to growth and prosperity. Now rising prices and environmental concerns make the shift to new sources of supply and new practices in the way we use energy unavoidable.

Meeting the challenges will be both difficult and time consuming, even with the benefit of new technologies. The price of energy will continue to rise due to increased production costs and the growing energy demand from population pressures. Even if we act quickly, the environmental impact of fossil fuels will remain. Those countries and communities that exhibit visionary leadership in the face of these challenges will be the ones to capitalize on the energy transformation and secure their future economic and social well being.

North Carolina faces an increasingly difficult energy future. The state will see higher and more volatile energy prices due to the cost of building new electricity generation capacity – now required for the first time in many years – and to our heavy dependence on automobiles for transportation. North Carolina is also especially vulnerable to the environmental impacts of energy use. These effects are likely to include a rise in sea levels on the developed coastline, more extreme weather events and increased air pollution from vehicles and coal-fired power plants. Air pollution has already reduced visibility in North Carolina's mountains and imposed frequent ozone alert days in our cities.

All of these challenges must be addressed in the context of North Carolina's growing population, which will explode from 9 million in 2007 to an estimated 13 million by 2030. Our state's challenge will be to grow its economy and its population while confronting higher energy prices, developing alternative energy sources and mitigating the environmental consequences of growing energy demand.

This challenge calls into question fundamental assumptions about North Carolina's economic development strategy. Until now our state has chiefly competed on price: low cost land, competitive wages, low taxes and inexpensive energy. Relative prices drive production, consumption, and investment decisions and explain why North Carolina has historically relied heavily on fossil fuels: they are less expensive. Energy prices will always matter, now and in the future. However, rapid growth will inevitably erode these advantages and require North Carolina to reconsider its economic development model.

North Carolina must take advantage of the opportunities available in new energy businesses and, at the same time, support our existing industries as they change their practices. If North Carolina pursues thoughtful change in the areas of regulation, finance, workforce development and technological transformation, our state will turn a threat into an opportunity and take the lead among other states and around the world.



Paving the Way for North Carolina's Energy Opportunities

While North Carolina faces an uncertain future in the face of these external constraints, a carbon-constrained world also presents important opportunities. North Carolina's leaders recognized these opportunities and began work to address these challenges in 2007 with the passage of a "renewable energy and energy efficiency portfolio standard" (REPS) – the first of its kind in the Southeastern United States. The REPS is a policy tool that requires retail sellers of electricity to produce a specific percentage of electricity from renewable sources. North Carolina's statute has four distinct goals:

1. To diversify the resources used to meet the energy needs of consumers;
2. To provide greater energy security through use of in-state resources;
3. To encourage private investment in renewable energy and energy efficiency; and
4. To provide improved air quality for citizens of North Carolina.

The requirements are phased in over time, with a 12.5% requirement for investor-owned utilities to be met by 2021, and a 10% requirement for electric membership corporations and municipalities that sell electric power to the state to be met by 2018. Duke Energy and Progress Energy, North Carolina's largest utilities, can provide up to 40% of the REPS requirements through energy efficiency measures in the year 2021.

The REPS, and the global realities that motivate it, have given rise to new industries and new markets even as they place pressure on the conventional energy system. Clean energy industries such as wind power and solar photovoltaics have witnessed a sustained surge in output since the late 1990s. Between 2003 and 2005, for example, global wind capacity grew 55%. Solar energy capacity grew 55% in 2005 alone.

The market for these technologies is vast with considerable future prospects: taken together, the global biofuels, wind power, solar, and fuel cell industries generated \$55.4 billion in revenue in 2006, an increase of 39% from 2005. At present rates of growth, this combined market is projected to reach \$450.0 billion in 2012. Sensing this opportunity, private investors have begun to direct significant financial flows to clean energy industries. This emerging energy future presents significant economic development opportunities, especially for states and regions that move early and aggressively.

IEI's Model Public Policy Process

IEI's program of work on energy is the result of a year-long public policy process that engages stakeholders in the development of effective policy solutions to address the challenges ahead.

May 2007

As a first step in the policy process, IEI convenes stakeholders at a Leadership Summit to collect expertise and opinions on the challenges and opportunities of the new energy economy. This information begins to shape IEI's energy program of work.

October 2007 – January 2008

IEI's Working Groups begin to make the connection between technical solutions and economic development opportunities by generating a bold vision for North Carolina that declares our future economic well being, environment and national security depend on North Carolina's leadership to drive change. Participants identify 20 specific action items to realize this vision in five areas: improving energy efficiency in buildings, reforming the utility regulatory environment, recruiting and sustaining new energy businesses, developing a green workforce and creating financing options. Progress on each of these action steps is provided further in the Appendix.

February 2008

Both the vision for the state's energy future and the action items to achieve it receive an enthusiastic reception from a record number of attendees at the IEI Forum entitled, "North Carolina's Energy Futures: Realizing a State of Opportunity."

October – November 2008

IEI collaborates with North Carolina's seven regional economic development partnerships and the North Carolina Cooperative Extension service to hold a series of Regional Energy Forums to explore economic development opportunities in the new energy economy. Through these Regional Energy Forums, communities explore ideas for creating and expanding jobs and businesses in the clean energy economy.

Fall 2008

IEI convenes a Business Committee on Energy (BCE) to educate the business community about North Carolina's dramatically different energy future. The BCE will help North Carolina's business leaders embrace change and consider institutional frameworks for developing and adopting long-term energy policies.



**"When I see global peril I see opportunity.
This is the right time to invest in clean energy."**

*Jeff Immelt
General Electric Corporation*

The 2008 Institute for Emerging Issues Forum

For 23 years, the annual Institute for Emerging Issues Forum has focused North Carolina's attention on those issues posing significant challenges to and opportunities for our state's economic growth and quality of life.

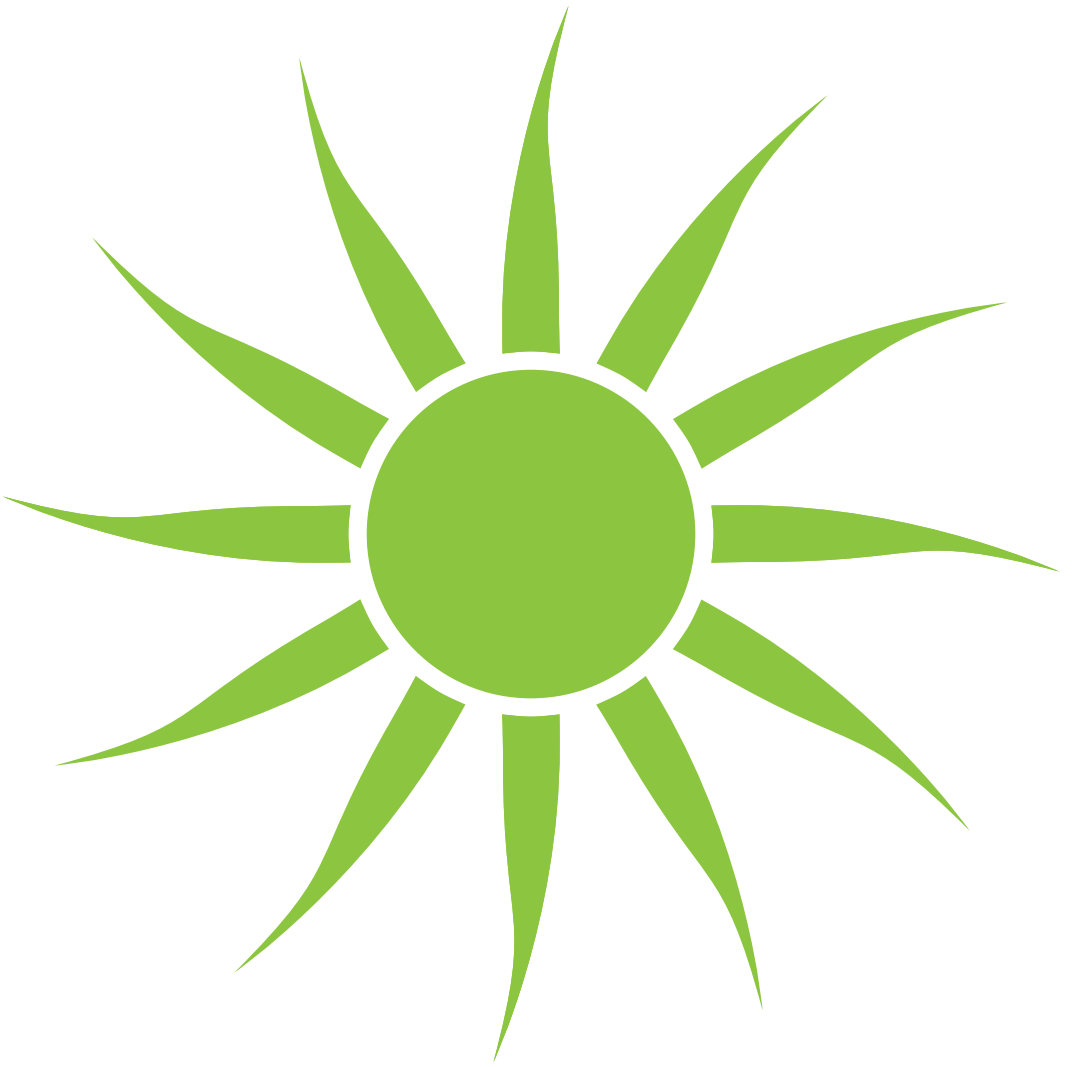
At the 2008 IEI Forum, entitled "North Carolina's Energy Futures: Realizing a State of Opportunity," more than 1,000 statewide, national and international policy-makers in business, government, nonprofits and higher education gathered to learn how to take advantage of economic development opportunities for the state's energy future.

Forum discussion and debate centered on the vision for North Carolina's new energy economy developed by IEI's Working Groups. The vision, and the 20 action items needed to realize it, met with enthusiastic support by Forum attendees. Audience members used survey response units to engage in real-time public opinion polling for the first time in IEI Forum history, providing valuable insight to the further development of IEI's program of work.

In addition to securing support for the energy vision, the Forum became a platform for addressing the vision with Governor Mike Easley's announcement of the creation of the Advanced Transportation Energy Center at North Carolina State University. The center is working to develop the necessary infrastructure to make the use of plug-in hybrid vehicles feasible.

Attendees also heard The New York Times' Thomas Friedman talk about the need for leadership from a national and global perspective, helping attendees understand how those developments will affect the new energy economy in North Carolina. The utility companies brought the issue into focus as Duke Energy's Jim Rogers and Progress Energy's Bill Johnson explained how their companies are adapting to meet challenges and opportunities presented by the demand for cleaner energy, addressing likely changes in the electric industry and its implications for North Carolina citizens.

After two days of exciting discussion around the challenges and opportunities in a new energy economy, Forum attendees left with a sense of urgency to make the necessary changes in our energy infrastructure to ensure a prosperous energy future.



IEI's Program of Work on Energy

IEI's program of work addresses the opportunities created as we attempt to manage both the environmental consequences of energy use and the increasing costs of fossil fuel. This 'new energy economy' creates all kinds of new industries, companies and jobs; but it requires the right set of regulations, financial support, workforce and business environments. IEI's program of work, therefore, has focused on the infrastructure changes needed for North Carolina to develop this new energy economy. As result of the analysis and debate fueled by IEI's model policy process, five critical foundations for the new energy economy were identified:

Improving Energy Efficiency in Buildings

Policies that promote energy efficiency — the idea of meeting energy needs by increasing efficiency instead of production — will return immediate economic benefits. If North Carolina can reduce its demand for costly imported energy through efficiency measures or through development of in-state resources, spending can be reallocated to local goods and services.

Reforming the Utility Regulatory Environment

A cooperative regulatory and institutional environment encompasses many things but can be summarized as consistent, coordinated and responsive policymaking. Favorable regulations for the clean energy industry depend on policy intervention including attention to changes in older regulatory environments that are not designed to accommodate different industries.

Recruiting and Sustaining New Energy Businesses

Protracted disputes on siting renewable energy facilities through out of date zoning and permitting regulations can threaten an industry's growth. Clean energy industries must deal with a complicated and heavily regulated industry and states whose regulatory environments are not favorable to these businesses will send a signal that these businesses should go elsewhere.

Developing a Green Workforce

The new energy economy will require significant adjustment in existing workforce development policies. While some existing skills, in manufacturing, for example, may be easily transferred to new energy enterprises, new ones will be required in areas ranging from the building trades to the automobile industry.

Creating Financing Options

Financial success is crucial for small companies and start-ups. Large manufacturing companies may not face the same challenges as the difficult growth stage for companies that have developed a potentially viable product and need more than mere R&D funding to expand. Such companies require seed investment in the form of long-term convertible debt or equity positions, and because the clean energy industries are relatively young and little understood, finding seed investment and even venture capital can prove especially difficult.

North Carolina's Energy Scorecard

The foundations of the new energy economy include strategies in energy efficiency, the regulatory environment, economic development recruitment, the workforce required to fill the jobs and the financial capital necessary to build these businesses. Economic opportunities in a low-carbon world are plentiful, but innovative practices in all five of these areas are required to make the most of them.

The following discussion describes how each of these five foundations contribute to the overall development and success of the state's new energy economy and outlines the progress North Carolina has made in these areas.

Improving Energy Efficiency in Buildings

Historically, the Southeast, including North Carolina, has had an abundant supply of inexpensive energy sources and therefore has not been driven towards energy efficiency investments. However, higher energy prices should push energy efficiency to the forefront of policy considerations. This reality was made clear in May, 2007 when Duke Energy reported that the cost of a new coal-fired power plant would be nearly 80% greater than its original estimate. Nuclear plant construction projects face the same challenges. Under these scenarios, cost-effective energy efficiency is a sound investment measure.

A growing population will result in increased demand for energy from utility companies to serve thousands of new residential and commercial buildings and millions of new appliances. North Carolina has a unique opportunity to supply power more efficiently and construct and outfit buildings with a greater attention to energy efficiency.

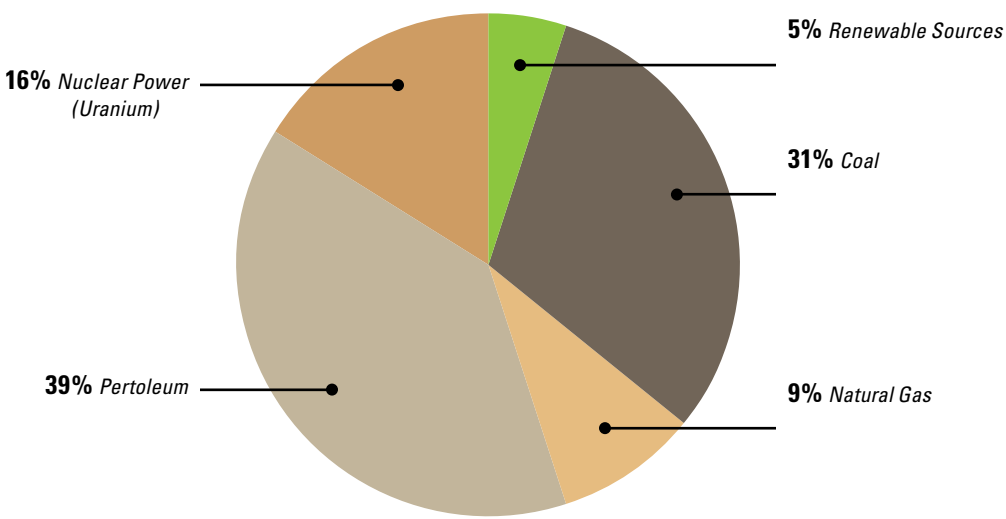
Buildings may last for sixty or more years, so getting it right from the outset is imperative. Creating energy codes for energy efficiency in construction is a good first step. In addition, energy efficiency resource standards that require utilities to meet energy savings through efficiency investments are another important strategy. Finally, efficiency standards for appliances and equipment would advance North Carolina as a leader in energy efficiency investments and bring companies and jobs to the state.

So how has North Carolina done? The state has had mixed success in the area of energy efficiency and still has a long way to go. All new state buildings must now be designed, constructed and certified with greater energy efficiency (30% greater than the American Society of Heating, Refrigeration, and Air-Conditioning Engineers standards). However, construction of local government buildings, including schools, has not been subject to this new standard. Standards for appliance and equipment efficiency still remain voluntary.

Recently, North Carolina's largest investor owned utilities have made voluntary investments in energy efficiency, but these stand alone actions are not mandated unless IOUs make energy efficient standards a part of the REPS statutory mandate. Duke Energy has proposed to reduce power demand by 1,700

megawatts in four years through its Save-A-Watt campaign, currently before review by the North Carolina Utilities Commission. As demand is reduced, Duke Energy will retire up to 800 megawatts of older coal plants. Similarly, Progress Energy has announced that it will displace 2,000 megawatts of power through demand side management and energy efficiency and will hold off on construction of any new coal-fired power plants.

North Carolina lacks public investment in energy efficiency research either through general revenues or through a fund generated by ratepayer surcharges. Energy efficiency has been explored through public-private partnerships such as the recently created Advanced Transportation Energy Center, formed by North Carolina State University and the two investor owned utilities with a goal of developing plug-in hybrids. This is a public-private partnership model that should be replicated in other areas.



Contribution of various sources to North Carolina's energy supply, 2005

Source: Data from Energy Information Administration, *Table 7: Energy Consumption Estimate by Source, Selected Years, 1960-2005* (www.eia.doe.gov/emeu/states/sep_use/total/use_tot_nc.html)

This graphic first appeared in *Popular Government* 73:3 and is reprinted with permission from the UNC School of Government.

The Utility Regulatory Environment

Today, North Carolina's electricity providers face an uncertain market and regulatory environment. While the state's citizens and businesses enjoy access to reliable and low-cost electricity, projected demand suggests a clear need to boost capacity and/or promote greater efficiencies in production, transmission and usage. Amid these competing priorities, the electricity sector, in conjunction with its government regulators, is now struggling to find an energy vision that takes these issues into consideration.

There are two early beginnings in how North Carolina is making reforms in the utility regulatory environment. The first is the implementation of the REPS rules, particularly with respect to the renewable energy credit market. North Carolina's renewable energy and energy efficiency statute uses "renewable energy certificates" (REC) to increase the flexibility and reduce the cost associated with regulatory compliance. The REC market creates a financial floor for the renewable industry and signals to companies that North Carolina is an important state to invest their renewable energy technologies. Tracking of renewable energy credits is one critical element in the success of reforming the utility environment.

The second is the way utilities earn a rate of return on energy efficiency investments. Historically, the utilities themselves have never been allowed to recoup any of their energy efficiency investments and additional revenue has come only through the sale of additional electricity to retail customers. As North Carolina pursues energy efficiency as a policy, utilities are now searching for a new business model that rewards energy efficiency efforts. To make strides in that direction, North Carolina needs to change the old utility model that allows for additional revenue with increasing energy sales.

The time has come to allow utilities to earn money for their investments in energy efficiency and to foster a public debate on the best strategy to meet the state's growing energy demand amid the environmental and public health concerns of energy production.

Recruiting and Sustaining New Energy Businesses

The economic payoff from the new energy economy comes with a general shift towards energy efficiency and renewable energy businesses. These include wind power, solar hot water, biomass, conversion of crops to biofuels, fuel cells, energy management firms, and energy software and electronics such as efficient batteries, construction, installation and appliances.

A recent IEI survey of energy businesses in these fields suggests that the state regulatory structure, access to capital and recruitment/workforce are the three most important criteria for these businesses' long-term future. Therefore, developing this new industry cluster requires a streamlined siting and permitting process, simple connections to the electricity grid, publicly provided seed money, tax credits and other incentives, and access to local labor through specialized university and community college programs.

The business survey also confirmed that the new energy economy is characterized by a predominance of young firms with less than 10 people that need access to investors, suppliers and customers. Small business centers with education in the area of the clean industry sector will focus attention on these companies' needs as they grow.

The state of North Carolina has begun conversations with the economic development community on the businesses' needs, but much work remains to be done in the areas of workforce development, financial incentives and a predictable regulatory environment. The first two areas will be described with greater detail in the next section, but a predictable regulatory environment runs the gamut from the implementation of the REPS statute, to local zoning and permitting requirements for a renewable energy company that might differ from the requirements of more traditional systems, to interconnection issues within the electricity grid.

IEI Survey of New Energy Businesses

IEI, in collaboration with the North Carolina Sustainable Energy Association (NCSEA) and MegaWatt Solar, developed *A Survey of New Energy Businesses: A Review of North Carolina's Business Environment*. Specifically, the survey targeted state regulations, siting and permitting issues, the financial environment, recruitment and workforce, and higher education assets.

Survey respondents represent:

- Firms that produce, deliver, service or invest in new sources of energy for the electricity grid, for local generation, or for transportation
- 28 business locations with 5,862 employees in North Carolina
- 323 business locations with 53,270 employees outside of North Carolina
- Firms in the solar (64%), biomass (28%), and wind (8%) sectors

The following are highlights of the survey results:

- State regulatory structure, access to finance, and recruitment/workforce are the three most important criteria when deciding to expand or locate in North Carolina.
- 41% feel that access to electricity rates below the national average is not important to their business model.
- 52% responded that the renewable energy industry tax credit is necessary for business in the state.
- 86% of respondents agree that state economic development incentives are key to the proliferation of renewable energy businesses, but only slightly more than half (56%) are aware of the types of incentives offered in North Carolina.
- 93% of respondents planned on making renewable energy investments in the next five years — 10% between \$1 million and \$5 million, 28% between \$5 million and \$50 million, and 34% over \$50 million.

Financial incentives that could with company start-ups, expansions, and recruitment include:

- An expansion of the NC Green Business Fund and no-interest or low-interest loans for small businesses
- Rebates, standards and long-term offers for renewable energy credits
- Tax breaks and free trade zones for manufacturing/assembly of renewable energy products

55% feel that the permitting process is more challenging in a green industry compared to other industries for the following reasons:

- General lack of knowledge or misinformation about renewable energy within the public and at all levels of government, particularly with respect to wind power, which can lead to restrictive regulations.
- Permitting agencies have not had extensive exposure to renewable energy industries and typically move much slower through the permitting process, as they require additional research.

Developing a Green Workforce

As states pursue the green economy, a key ingredient is a workforce to fill the jobs required by these new businesses. The largest number of jobs will be in the growing solar industry, particularly in the construction field. IEI's survey of new energy economy businesses found that engineers and installers are the occupations in highest demand and North Carolina is second only to California for recruiting skilled workers.

Therefore, as North Carolina captures the economic benefits from a clean energy future, economic development strategies must focus on what kinds of firms we want to recruit in the new energy future and what kinds of skills those workers will need. In many cases, this will require an adjustment in workforce development policies, but skills may be easily transferable to energy enterprises, such as those required in the building trades (for energy efficient construction) or in the automotive sector (for clean automobiles). The most efficient way to prepare for these new jobs is to build upon the existing foundation of North Carolina's state and local workforce development systems and to embed green skills training into existing curriculum rather than investing in entirely new programs. Existing research shows that these jobs require more than a high school education but typically less than a four-year degree, making the North Carolina Community College System an important asset for preparing these new workers.

The emerging green workforce can create jobs across several different categories: research and development, manufacturing of clean energy components and equipment, producing and distributing clean energy (biofuels, solar, wind), and construction and maintenance (site assessments, energy efficiency implementation in buildings). An added benefit to states such as North Carolina, where poverty is on the rise and manufacturing jobs have been lost overseas, is these new jobs can help build and maintain the manufacturing base here at home.

PPG Industries, located in Shelby and Lexington, North Carolina, is a perfect example of this point. Facing increasing competition from China, PPG Industries made the corporate decision to retool its manufacturing to supply fiberglass to the wind turbine industry. Today, the company has seen a dramatic turnaround and successfully made this transition with a great deal of help from community colleges and local officials that offered incentives to offset the costs of restructuring.

So how is the state of North Carolina doing in the area of green workforce? A lot of the right conversations are happening as the REPS statute is in its first year of implementation. The North Carolina Sustainable Energy Association has begun implementation of their workforce development program to assess workforce shortages and knowledge gaps in the area of building sciences and the solar industry. Their research shows that existing renewable and energy efficiency jobs could exceed 6,000 primarily in or with firms associated with the manufacturing sector. In addition, IEI has collaborated with the North Carolina Community College System on ways to integrate green workforce skills into their technical education program.

Creating Financial Options

Capital markets are pouring increasing amounts of money into companies and projects supporting green technologies and products, whether through angel investment and venture capital in the case of start-ups and small growing companies, or through more conventional commercial lending. In the United States, new venture capital investment in renewable energy companies was \$1.5 billion in 2006 and nearly doubled in 2007 to \$2.8 billion.

There are, however, several barriers to the research and commercialization of promising energy technologies. These businesses are in a new field, with relatively untested technologies and business models, and often with an uncertain business and regulatory environment. Two factors bode well for renewable energy companies in North Carolina's future: (1) the rising costs of production and (2) tax credits for renewable energy. Higher costs for traditional power plants will make renewable sources cost-competitive by comparison. North Carolina's renewable energy tax credit can help finance system installations (35% of the cost of the installed system up to \$2.5 million per project or 50% of investor's tax liability), which positively affects North Carolina's renewable energy market.

That said, there are a variety of activities that would jump start, complement and support the development of these markets. First, North Carolina does not have a public benefits fund for developing promising technologies into commercial application. The renewable energy credit market – an important trading platform for renewable energy companies looking to finance their investment – is not mature yet. The unknown future of distribution and energy storage technologies cause the state to fall far short of its potential.

IEI's business survey offers some more conclusive evidence about financial incentives. 86% of respondents agreed that state economic development incentives are important to their decision to move to or expand within North Carolina, but only half were aware of the types of incentives offered within the state. Almost half the respondents are having difficulty raising capital to move a product or service to market. Respondents indicated that financial incentives that could help alleviate these problems include no-interest or low-interest loans for small businesses, rebates, standards and long-term offers for renewable energy credits, tax breaks and free trade zones for manufacturing/assembly of renewable energy products. Therefore, while North Carolina has made strides in the financial arena, we may not be offering the most important financial products for these businesses.

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“Folks could be heroes in the transitional clean-tech economy if they receive specialized clean-tech job training and placement.”

*Majora Carter
Sustainable South Bronx*

Overall Score

Although any effort to build these five foundations is a positive step towards a flourishing new energy economy, without adequate leadership at the state level and a comprehensive plan for the future, progress may stall.

North Carolina's electric sector is currently comprised of two large investor owned utilities, 27 electric cooperatives and over 70 additional communities that generate or deliver electric power on their own. Through its Leadership Summit and its Working Groups, IEI heard a clarion call for an effective institutional framework for developing and adopting an integrated, long-range energy policy. At present, North Carolina is home to a variety of organizations and institutions with energy initiatives, applied research, education, policy implementation and grant administration. However, the state lacks a long-term vision for its energy policy and a single voice to make the vision a reality.

The challenges and opportunities surrounding higher prices for electricity, natural gas and fuel for transportation and their associated environmental problems has forced North Carolina to seek out alternative measures to keep up with the growing population and energy supply demand. A "new energy economy" is upon us and the time to act is now. North Carolina's policy and business arenas must embrace these changes and consider a progressive framework to develop and adopt long-term energy policies. The state has taken significant steps in the right direction, but much more work needs to be done and IEI will continue to collaborate with local business and state leaders to generate new ideas for the creation and expansion of jobs and businesses in the clean energy economy across the state.

Appendix

IEI's energy program of work brings an explicit focus to the economic development opportunities presented by a carbon-constrained world where energy conservation, efficiency and renewable energy are front and center. This "new energy economy" creates new industries, new companies and new jobs while at the same time helps address important environmental concerns. IEI's overall energy program of work is designed to promote a dialogue among stakeholders on the explicit strategies for how state and local governments can help support this transformation.

IEI's Working Groups, convened in the fall of 2007, identified 20 specific action items to foster the development and deployment of new technologies in the energy efficiency and renewable energy sectors. They include action steps for the business, state and local government, higher education and non-profit sectors. At their core are recommendations for removing impediments to and creating incentives for the research, production and consumption of these technologies.

The action items are grouped into five areas:

- Improving energy efficiency in buildings
- Reforming the utility regulatory environment
- Recruiting and sustaining new energy businesses
- Developing a green workforce
- Creating financing options.

At the 2008 Emerging Issues Forum, IEI committed to report on the progress of the twenty action items developed by the Working Group members. This progress is outlined on the following pages.

Improving Energy Efficiency in Buildings

1. *Require new building standards.*

Raise the bar in building standards and codes, aiming at best practices from across the country in energy efficiency, water efficiency and the use of renewable energy sources.

As of October 2008, all new state building contracts must be designed, constructed and certified to be at least 30% greater in energy efficiency than the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) standards for building design and construction. Guidelines to meet this standard are currently being written by the North Carolina State Construction Office. Adoption of the same standard for local government building construction still remains to be done, but action in the recent Short Session of the NC General Assembly indicated some support (introduction of HB 2531). Finally, implementation of building codes is uneven across North Carolina. Additional efforts to train code officials in the changes and funding for sufficient staff to conduct adequate review and inspection is a critical need if North Carolina expects building codes to be an effective means of changing energy consumption.

Recently, Governor Easley's office received a \$500,000 grant from the U.S. Department of Energy to review and support changes to the North Carolina Energy Code for all new residential and commercial construction, not just new state building construction. Partnering with the North Carolina State Energy Office, the North Carolina Department of Insurance, the North Carolina Chapter of the Institute of Architects, and Appalachian State University, the goal is to approve a code that exceeds ASHRAE 90.1-2004 and/or the International Energy Conservation Code (IECC) by 30% from 2009-2010. Once consensus has been reached on the proposed code, the Governor's office will work with the NC Building Code Council to gain its approval.

2. *Require public best practice.*

Public or publicly financed construction should adopt energy efficient standards and codes.

SB 668 requires the energy efficient construction of all state buildings as outlined in detail below. In addition, several school systems, such as Chapel Hill, Guilford and Wake counties require that new buildings be LEED Gold certified. The North Carolina League of Municipalities (NCLM) has introduced the NCLM Green Challenge to its members. Participating cities and towns choose practical actions that can save energy, money and natural resources through adoption of a sustainable plan by the governing body, creation of an energy improvement plan, and/or conducting an energy audit of facilities. Special recognition will be given for accomplishments at the NCLM Conference in Charlotte October 12-14th.

3. *Model practices by higher education.*

Universities and community colleges should provide comprehensive leadership in the new energy economy through the use of innovative technologies and energy efficient behavior.

The University of North Carolina has embraced sustainability as one of its core values in response to the recently appointed University of North Carolina Tomorrow Commission. A UNC sustainability



committee was set up to support a system wide sustainability policy for consideration by the President and University of North Carolina Board of Governors. The adoption and implementation of a sustainability policy would consider each campus' resources, needs, and objectives and focus on sustainability in eight areas: master planning, design and construction, climate change mitigation, transportation, recycling, purchasing, operations and maintenance and integration of sustainability principles.

In addition to this development, all 17 UNC institutions of higher education are required to submit an energy plan annually each October. Finally, the Chancellors of North Carolina State University, the University of North Carolina at Chapel Hill and Appalachian State University adopted the American College and University President's Climate Agreement to reduce the carbon footprint and aim toward carbon neutrality. NCSU further committed that all new buildings will be LEED silver standard and committed to the US EPA Energy Star program.

4. *Provide efficiency incentives.*

Provide incentives for increasing the efficient use of energy in the residential, commercial, industrial, and government sectors, so lowering energy costs and increasing competitiveness.

In each of the past two legislative sessions, North Carolina earmarked \$5 million to establish an Energy Efficiency Reserve Fund. In April 2008, Governor Easley announced the recipients of North Carolina's first wave of grants to implement fifty-eight energy saving projects at ten state agencies, fifteen UNC campuses and six community colleges. While not all projects have a huge financial return, they all provide substantial savings.

With the exception of this reserve fund, state government does not directly provide efficiency incentives to lower energy consumption. Universities have some flexibility with their budgets and can retain operational fund savings for up to 2 years. But with that exclusion, state governments are unable to retain any cost savings in their budgets for utility savings and there is a disconnect between the capital construction and operating and maintenance costs associated with energy decisions. That said, responsible, aggressive agencies are more likely to receive grant funding.

5. *Educate officials and planners.*

Educate state and local leaders and agency staff about the requirements of energy efficient and renewable energy construction.

The State Energy Office has several energy education programs, such as the energy management diploma program for state employees as well as free educational workshops on reducing energy expenses in public buildings, commercial facilities and residences held at each county's cooperative extension office. In addition, with the recent passage of SB 668, the Department of Administration has established and will train an additional team to examine existing state facilities to identify and recommend energy conservation, maintenance, and operating procedures designed to reduce energy consumption. Finally, IEI conducted a panel discussion on renewable energy issues at the annual meeting of the North Carolina Association of County Commissioners.

Reforming the Utility Regulatory Environment

6. *Reward smart management.*

Design a regulatory environment that rewards utilities, electric cooperatives, municipalities and others for providing all types of energy services — electricity, energy efficiency and load management.

The two key issues in rewarding smart management that are receiving attention are how investor owned utilities get paid (in other words can they be paid for energy efficiency efforts) and how the state should regulate energy efficiency. For example, Senate Bill 3 requires the North Carolina Utilities Commission (NCUC) to determine parameters for utility incentives. Currently, Duke Energy's Save-A-Watt program, docket number E-7, s831 is before the NCUC. In addition, Progress Energy's integrated resource program has three proposed programs including solar water, smart grid, and buildings, which will provide an opportunity for regulation of energy efficiency and load management.

7. *Reform utility rate structure.*

Create incentives and remove disincentives for utilities and consumers to profit from increased efficiency and transparent pricing.

Senate Bill 3 has a requirement that the North Carolina Utilities Commission study whether rate structures, policies and measures in place in other states that support renewable energy and energy efficiency should be adopted by North Carolina. That study requirement led to the rate study currently before the North Carolina Utilities Commission (NCUC) under docket #E-100, section 116. The NCUC concluded in that study that it is premature to consider any additional changes to the utility rate structure before it has been determined that the incentives under the Senate Bill 3 – the Renewable Energy and Energy Efficiency Portfolio Statute - serves their intended purpose. Currently, a utility may recover its costs associated with new energy efficiency measures outside of a general rate case but no additional decoupling measures will be pursued at this time.

Programs have been proposed under Senate Bill 3, such as Duke Energy's Save-a-Watt program, but the NC Utilities Commission has made no decision as to whether this is an acceptable energy efficiency approach.

8. *Create a renewable energy credit market.*

North Carolina needs to manage, measure and verify a market for renewable energy credits.

The rulemaking on the renewable energy credit market appeared in the NC Utilities Commission docket number E100, S113 under the SB 3 statute. Tracking of renewable energy credits is one critical element in its success, but negotiations are currently underway between the Public Staff, investor owned utilities and the NC Sustainable Energy Association on agreement of how this filing should be handled.

Carbon is likely to be a much more significant driver and will occupy most of the national attention in the next few years. NC GreenPower in conjunction with the state's utilities has created a North Carolina carbon offset market which will be officially launched in October 2008.

Discussions with stakeholders concerned with North Carolina's utility regulatory environment identified a fundamental obstacle, faced by policy makers, stakeholders and others, as North Carolina prepares for a transformed energy future. North Carolina must combine focused leadership with credible, independent analysis and information. North Carolina needs to achieve the following goals:

- A comprehensive, integrated energy policy
- Coordinated state energy initiatives and state agency actions
- Rigorous, timely and independent analysis of data
- Broad citizen education and workforce preparation

To accomplish these goals, the synthesis and analysis of data and information should occur in an independent, professional institution situated at arms length from the policy process, perhaps within the North Carolina Utilities Commission. Pursuit of a credible agency charged with energy data collection and information is as important as changes to the utility regulatory environment discussed above.

Recruiting and Sustaining New Energy Businesses

9. *Inventory North Carolina's new energy economy assets.*

Inventory existing assets in the new energy economy (e.g. university R&D, existing supply chain elements) and use the inventories to identify energy-related cluster opportunities.

The Appalachian State University Energy Center recently completed the "North Carolina Economic Developer's Guide to the Renewable Energy Industries," an inventory of over 100 companies involved in manufacturing and the development of green technology. Using that methodology as a starting point, IEI in collaboration with the University of North Carolina at Greensboro developed an asset inventory of potential supply chain opportunities in the new energy economy. The basis of these two efforts will be folded into IEI's Regional Energy Forums.

10. *Match research to targeted clusters.*

Identify areas of excellence within the public university, private college, university, and community college systems and match those identified areas with energy firms or clusters targeted for recruitment, retention and entrepreneurship. Link actions to measures adopted in response to UNC Tomorrow Commission recommendations.

The University of North Carolina Tomorrow Report notes that UNC campuses should assume a leadership role in addressing the state's energy and environmental challenges and leverage its existing research expertise to solve energy challenges. For example, UNC should connect its energy research centers at North Carolina A&T and Appalachian State University system-wide and connect extension



**"We've got to approach this by looking at
the possibilities and not the limitations."**

*Jim Rogers
Duke Energy Corporation*

efforts across the state. In the RTP area, the Research Triangle Energy Consortium was founded as a collaborative effort of Duke University, North Carolina State University, the University of North Carolina at Chapel Hill, and RTI International. The mission of the consortium is to take an integrated approach to solving energy problems using the world-class scientists, engineers, economists, and other disciplines available in the Research Triangle area of North Carolina and based on that research help solve energy issues.

11. Use incentives for targeted industry recruitment and retention.

Use incentives for targeted recruitment and retention of firms and industries in the new energy economy.

The Green Business Fund was established in the 2007 General Assembly Session to provide grants to private businesses with less than 100 employees, non-profit organizations and state agencies to encourage the growth of a green economy. Administered by the North Carolina Board of Science and Technology, grants have been given to encourage the development of the biofuels industry; to foster the development of the green building industry; and to leverage investments in additional clean technology and renewable energy products and businesses. The North Carolina Department of Commerce through the Economic Development Board will be examining how to recruit companies in the new energy economy to North Carolina. The Department of Commerce would benefit from scans of the North Carolina business environment as it relates to all of the industries in the new energy economy.

The North Carolina Solar Center has been working with clean energy startups in Eastern North Carolina to commercialize their businesses. In addition, the Solar Center Engineering Staff works with mid-sized companies to demonstrate and validate their technologies before they are out of the lab and into the marketplace.

For the past five years Advanced Energy has been training Building Performance Specialists and supporting the development of their companies. This has built a state-wide network of skilled contractors who can deliver energy efficiency services to residential and small commercial customers. Advanced Energy also supports the testing and demonstration of innovative technologies in order to speed their adoption into the market (e.g. MicroCell, Megawatt Solar).

12. Expand transportation fuel diversity.

Design and implement tax and regulatory incentives for the adoption of a wide range of transportation fuels.

The Biofuels Center of North Carolina was established by the General Assembly to create an entirely new industry for North Carolina. Funded with a \$5 million initial appropriation from the 2007 General Assembly, the non-profit corporation will, in coming years, implement North Carolina's Strategic Plan for Biofuels Leadership goal where by 2017, 10 percent of liquid fuels sold in North Carolina will come from biofuels grown and produced within the state. The Biofuels Center is looking for research that pinpoints where North Carolina can develop different biofuels inputs, given the technologies now in development such that all elements in the supply chain are profitable. In addition to creation of the Biofuels Center, passage of other statutes require diesel school buses to use a minimum B-20 fuel and allow for the distribution of E-blend fuel.



13. *Review land use.*

Adapt land-use regulations to allow for new energy businesses to be located in North Carolina, especially small- and medium-sized renewable energy businesses.

Action on this issue has been limited, in part due to the education necessary to make the regulatory environment more amenable to renewable energy businesses. One of the recurring comments IEI has heard throughout its energy program of work is that the regulatory structure does not meet the needs of new energy economy businesses (zoning, land use regulations and other local regulatory structures are dated and do not provide sufficient flexibility for this nascent industry). That said, IEI has been pushing this issue through presentations at the North Carolina Association of County Commissioners and other venues.

14. *Educate economic developers and workforce development agencies.*

Educate economic development organizations, their members and workforce development agencies about the business service and workforce needs associated with the new energy economy.

Appalachian State University's Energy Center published the "Economic Developer's Guide to the Renewable Energy Industries" which outlines over 100 companies involved in either manufacturing or developing green energy technologies. The Energy Center is working on the next volume of the Economic Developers Guide in addition to working with local governments and the economic development partnerships to leverage economic development opportunities.

The North Carolina Sustainable Energy Association (NCSEA) has begun a multiyear program of work to promote awareness and dialogue about economic opportunities in North Carolina's renewable energy and energy efficiency industries; to assess potential workforce shortages and knowledge gaps; and to create training initiatives in concert with existing workforce and economic development strategies. First, their research shows that existing renewable and energy efficiency jobs could exceed 6,000 primarily in or with firms associated with the manufacturing sector. On a parallel path, NCSEA has begun a working group process for specific workforce needs of the solar and building sciences sectors. The findings of this collaborative process will be available February 2009. It is expected that a focused training program will begin in the fall of 2009.

In addition, IEI will discuss the workforce needs of the new energy economy at the annual conference of the North Carolina Community College System-wide conference in October 2008. Unlike other sectors, the energy sector requires a broad spectrum of jobs such as plumbers, installers, as well as accountants and other white-collar jobs. Therefore, any approach by the NCCCS must be broad-based, which is the current strategy being pursued. Concurrently, the North Carolina Rural Center is presenting at the 2008 Workforce Development Partnership Conference on "Green Jobs and Workforce Development." Local and state workforce development partners, especially local workforce development boards, JobLink Career Centers and JobLink partner agencies such as ESC and community colleges, attend this event.

The North Carolina Rural Center has also funded the North Carolina Environmental Education Fund to survey North Carolina and develop a framework for training economic developers in the "green economy." The Rural Center operates mostly as a funder rather than a producer or consumer of economic development information. For example, they are providing Economic Innovations grant funding for the "Energy-Efficiency Repairs and Renovations Program" (through Roanoke Economic Development, Inc.) to promote energy conservation, economic growth, job creation, and improve the living standards in Northeastern North Carolina by linking homeowners, business owners, churches,



“The climate conversation is about cost burden and sacrifice. Protecting the climate is not costly but profitable. Discussion ought to be about profits, jobs and competitive advantage. Smart companies already understand this.”

*Amory Lovins
Rocky Mountain Institute*

industries, and the general public with licensed qualified general contractors that are skilled in energy-efficiency repairs and renovations.

Additional work in this area would include scans of the North Carolina business environment as it relates to the various industries in the new energy economy. Information needs include details on the regulatory environment, incentives, existing businesses already in North Carolina, workforce information, taxation levels, access to capital and statewide research and development.

15. Remove implementation barriers.

Remove permitting and other regulatory barriers to energy efficient and renewable energy construction, especially at the local level.

As noted above in action item #13, education surrounding the implementation barriers and strategies on how to remove them is the first step in seeing this recommendation through. IEI designed a survey of new energy businesses that produce, deliver, service or invest in new sources of energy for the electricity grid or local generation. The survey found that a majority of respondents found permitting more challenging in a “green” industry. Responders noted that “siting and interconnection are unique to this industry,” and “permitting agencies have not been exposed to these projects and typically move much slower and require supporting documents and research.” With this kind of data, action is the next step.

As a first step, the North Carolina Wind Working Group developed a model ordinance related to siting and permitting wind facilities. Counties across North Carolina (especially in the western mountains and coastal regions) are being approached with questions related to economic development and the new energy economy as renewable energy developers and local landowners site new sources of energy.

Developing a Green Workforce

16. Match curricula to energy skills.

Match higher education curricula and programs (four-year, community college and continuing education) to the skill sets required by firms/clusters in the new energy economy. Link actions to measures adopted in response to the University of North Carolina Tomorrow Commission recommendations.

The North Carolina Community College System does not have a system-wide strategy for developing curriculum to match the skills needed in a new energy economy. However, individual campuses have developed programs on their own. For example, Asheville-Buncombe Technical Community College has incorporated a LEED program into their construction certification program. Nash Community College has an alternative fueled vehicles program as a component of their automotive program. Central Carolina Community College has a two-year degree in biodiesel, the first in the state.

Cynthia Liston of Liston Consultants developed an analysis entitled “Tomorrow’s Workforce: An Occupational Supply and Demand Analysis for North Carolina’s Community College System, Excerpts Related to Clean Energy.” Liston broke the clean energy cluster into the components of manufacturing clean energy, producing and distributing clean energy, and green construction and energy efficiency. Her analysis looked at occupations related to clean energy and noted occupations likely to grow in

North Carolina: manufacturing technicians, nationally certified PV and solar thermal installers, energy auditors and biodiesel plant technicians. The next step will be to examine how the community college system can train and educate workers necessary for these growth occupations.

IEI will be participating in a dialogue at the NCCCS conference in October about how to approach a longer-term strategy to meet the state's energy workforce needs based in part on Liston's results. In addition, NCSEA plans to have results for the building installation and solar industry's workforce needs in the next year. Action based on those results are a year or two away. The requirements of Senate Bill 3 and the state's comparative advantages will necessitate job skills and training and those conversations are in progress.

17. Create a science-based advantage.

Create a seamless set of technical and science-based curricula and research on university and community college campuses that will be a competitive advantage for the state, especially in areas such as biofuels, power engineering, electronic controls, and transportation engineering.

The Advanced Transportation and Energy Center (ATEC) at North Carolina State University was established in partnership with Progress Energy and Duke Energy to pursue the development of plug-in vehicles for North Carolina. In particular, ATEC is designing a low-cost battery and a recharging network for cars to further the electrification of the transportation sector.

North Carolina State University's College of Engineering will receive a \$1.25 million endowment gift from the Duke Energy Foundation to support workforce development, teaching and research related to the clean generation and delivery of energy. The gift creates two named professorships in nuclear engineering and electrical and computer engineering and a K-12 educational outreach fund to promote development of the future engineering workforce.

Gary Gereffi with the Center on Globalization, Governance and Competitiveness at Duke University has developed a global value chain analysis approach for several industries including the supply chain for energy and the environment. The Center includes R&D, key inputs to products and sales and identifies where North Carolina strengths are within the supply chain.

Creating Financing Options

18. Support new initiatives.

The General Assembly should consider establishing a larger public benefits fund, to seed new initiatives in basic and applied research, consumer and civic education, and support for energy efficiency measures.

Capital markets are pouring increasing amounts of money into companies and projects supporting "green" technologies and products, whether through angel investment and venture capital in the case of start-ups and small growing companies, or through more conventional commercial lending. In North Carolina, recently passed Senate Bill 3 requires the deployment of alternative forms of energy generation and charges the electric utilities with primary responsibility for the promotion of energy efficiency. Collectively, these efforts promise to significantly reshape the state's energy sector and help generate new jobs and businesses.

However, there are a variety of activities that would jump start, complement and support the development of these markets that, at least for the moment, are not being funded by the private sector. Because these activities serve larger public policy goals relating to economic development, energy security, and environmental protection, North Carolina might consider establishing an independent source of funds for these purposes, such as accelerating the development of technology from initial research; financing commercialization; and, finally, supporting an institutional framework to coordinate many of the activities already present in the state. In the absence of broad support for an additional public fund, working with the state's small business centers in the existing institutional framework might help further develop these new companies.

19. Mobilize the financial sector.

Encourage the broad mobilization of the financial sector behind energy efficient and renewable energy initiatives.

North Carolina legislative leaders should significantly expand the Green Business Fund to serve as "early stage" funding for promising companies and establish a North Carolina tax credit for investment in green and renewable energy businesses. Developing green underwriting that, for example, provides incentives to both business and residential borrowers for energy efficiency and renewable energy implementation, is a step the state's financial institutions can and should consider.

20. Maintain and upgrade power lines and pipelines.

Provide financial support and other incentives for the maintenance of transmission lines and pipelines to support access for renewable energy and to sustain a critical infrastructure for economic development.

Once renewable and energy efficiency technologies are deployed they must connect to the electricity grid. The expansion of the electric grid and liquid fuels distribution system must be expanded to include more remote areas of the state that are good locations for the development and deployment of renewable energy resources. Supporting energy related business development is already well established in North Carolina through the financing of a natural gas pipeline in eastern North Carolina. That said, there is no proposal for expansion of distributed generation throughout the state.

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The Institute for Emerging Issues acknowledges the work of the following Working Group members, whose participation in the working group process informed the break-out session and subsequent policy actions of IEI's Program of Work on Energy.

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