

Meeting the Challenge of Climate Change in North Carolina

Douglas Crawford-Brown

With the publication of the 2007 summary report of the Intergovernmental Panel on Climate Change (IPCC), global scientific agreement—not unanimous but overwhelmingly consistent—has emerged that human society has become a significant driver of the climate.¹ The potential impact of global climate change on North Carolina is perhaps the most daunting environmental challenge facing the state. The challenge comes from a number of key issues on which policy and other decisions must be made:

- Greenhouse gases linked to climate change are both natural and made by society. Society's contributions sit on top of a very large cycle of carbon in the environment. This fact may lead people to believe that actions in their communities are insignificant. However, North Carolina consists of the communities within it, and the collective actions of these communities, made possible by help from local and state government leaders, ultimately yield solutions to climate change.
- North Carolinians emit greenhouse gases in pursuit of important human needs: warmth, employment, the industrial products that make their lives enjoyable, and more. Policy responses must find ways to reduce emissions without sacrificing quality of life. A policy that fails to recognize this simple reality will not be sustainable.

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- All North Carolinians are part of the cause of—and the solution to—climate change. Changes must come from all levels: the nation, the state, communities, energy sectors, institutions, and individuals. These actions must be coordinated because changes at one level can either enhance or prevent changes at other levels.
- There is significant uncertainty about the extent to which human activity brings about climate change, the effectiveness of any changes people might make, and the impacts of climate change on North Carolina. This uncertainty must be recognized and admitted, or people will cease to trust decision makers. Two possible sins are involved: the sin of failing to admit to uncertainty and the sin of hiding behind that uncertainty to avoid taking actions.

This article is designed to help communities across North Carolina sort through these issues. It is organized around a series

of questions that communities might face in choosing a path forward. Readers who find the questions interesting and want to explore answers as they decide how their own communities should respond are invited to contact the UNC Institute for the Environment for advice and assistance.²

Why Should There Be Any Action?

The science of climate change has grown immensely over the past twenty years. What began as a concern of only a few scientists, mired in profound un-

certainty, has emerged as agreement among the vast majority of the scientific community. A few skeptics argue that society is having little or no impact on the climate, but the judgments of these few must be weighed against the conclusions of literally every major scientific organization in the world, including the U.S. National Academy of Sciences. The picture is not yet fully clear (it never is in science), but the threat of inaction is real and potentially troubling for North Carolina (see Figures 1a and 1b).

The impetus for action does not come only from concerns about climate change. The emission of greenhouse gases in North Carolina results largely (although not entirely) from the use of energy to power homes, businesses, and cars. Even if a policy maker does not believe in climate change or is not concerned about the effects it might bring, he or she must ask other key policy questions. Is there concern about the rising

costs of energy in the homes, the businesses, or the communities of North Carolina? Is there a search for “energy security”—that is, a reduction of the state's dependence on

other states or nations to power its economy? (North Carolina exports almost \$10 billion per year in energy costs. These costs could be recaptured for use in economic development for North Carolina businesses.) In counties devastated by the loss of the tobacco and manufacturing sectors, are there opportunities to develop companies focused on the new sustainable energy systems?

An answer of yes to any of these questions leads to policy choices that focus on bringing sustainable energy supplies to North Carolina. These choices will at the same time produce

North Carolina exports almost \$10 billion per year in energy costs.



precisely the change in the state's energy system needed to combat climate change. North Carolina can be thought of as a community of consumers of material and energy, providers of materials and energy, and regulators that control the stage for this process. All the members of this community must be engaged to develop effective strategies, for all provide causes and solutions.

It is not yet clear what the exact impacts of climate change will be on North Carolina or when they might be expected to hit, but the scientific community is quite confident that the impacts will be sufficiently profound to warrant action now. For this reason, making climate change policies is best thought of as buying insurance against impacts.

The likely impacts include the following:

- A rising sea level that eventually will cover some of the most valuable coastal land in the state
- An increase in summer heat waves that are responsible for heat-related deaths
- An increase in pollutants such as ozone that are produced at higher temperatures
- An increase in extreme weather events such as hurricanes—a particular worry in North Carolina because the state sits at the center of the path of hurricanes moving up from the Atlantic
- Strong fluctuations in the availability of water, with both prolonged droughts and flooding from storms
- Increases in infectious diseases and allergies (and a longer allergy season)

- An array of economic hits, including loss of valuable land at the coast, a decline in the tourist industry, business interruptions due to extreme weather, and increasing health care costs associated with the changing rates of disease

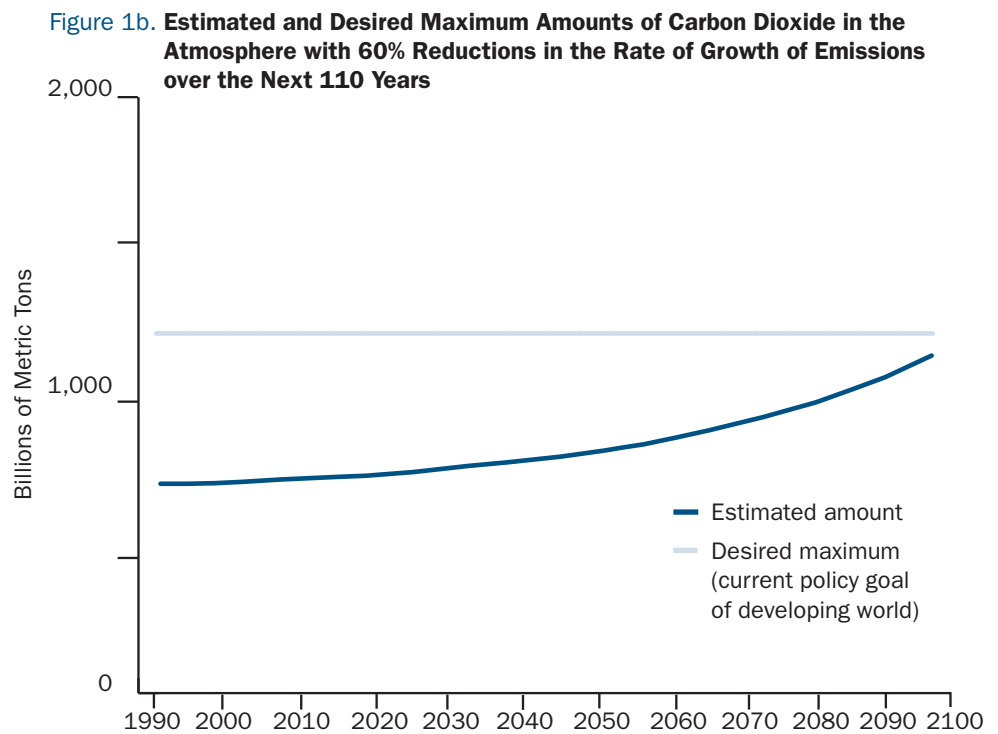
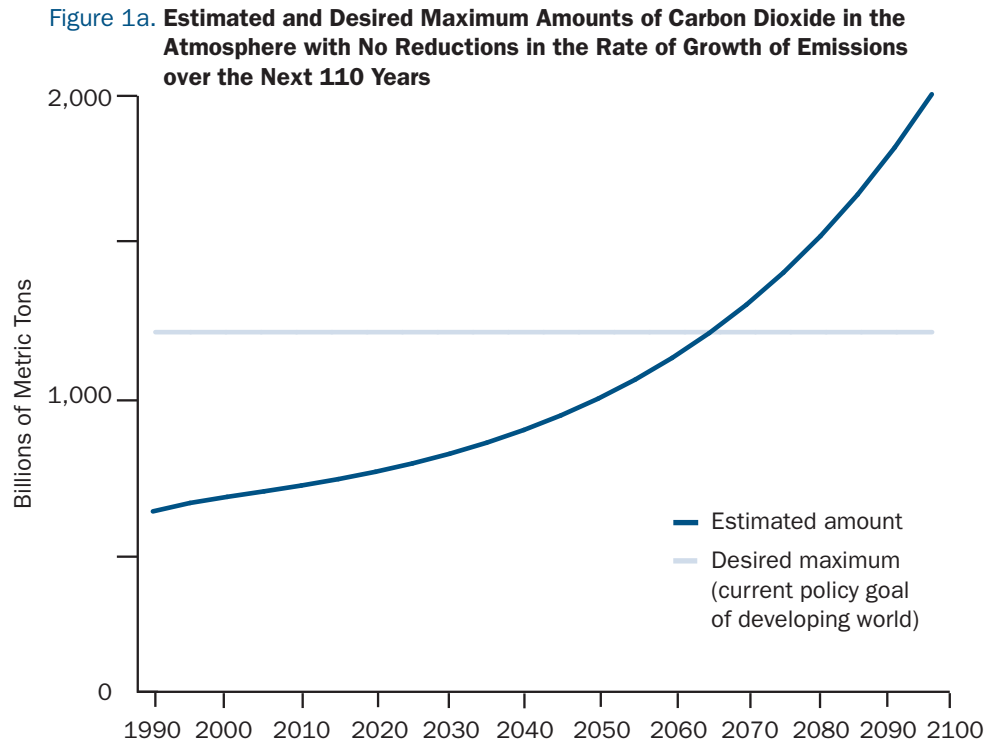
As just one of many possible examples, a recent report for the National Commission on Energy Policy estimates that sea-level rise alone will result in the loss of almost \$4 billion in real estate along the North Carolina coast before the end of the century.³ All such costs will lower the economic efficiency of the state at precisely a time when it is going through profound economic changes due to the loss of its traditional economic base.

Who Should Take Action?

The joint U.K.–U.S. Community Carbon Reduction Program, with an arm in the United States run through the UNC Institute for the Environment, identifies six levels at which effective climate change policy must be addressed and coordinated in North Carolina (or anywhere): the nation, the state, communities, energy sectors, institutions, and individuals.⁴ The need to tackle the problem at so many levels makes the creation of effective policy daunting.

The nation. Effective national policy is required to level the playing field across states and utilities. The policy undoubtedly will involve both a cap on emissions and creation of a “carbon market” or a “carbon tax.” In a carbon market, companies that emit too much carbon dioxide would purchase additional emission quotas from companies that are emitting less than their quota. Under a carbon tax, every unit that emits carbon dioxide would pay a tax that would either go into a common pool to fund innovations in energy technologies or cause a rise in energy prices that would stimulate development of new technologies emitting less carbon dioxide.

Under either system, the price of carbon would need to be much higher than it currently is to stimulate the market (\$50–\$100 per ton rather than the present value of less than \$10 per ton). Further, a patchwork of inconsistent strategies across states, coupled



Source: Based on a model published in Douglas Crawford-Brown and Sarah LaTocca, “Teaching Systems Principles and Policy Applications Using a Reduced-Scale Global Warming Model,” *Journal of Geoscience Education* 54 (2006): 101–120.

with an emerging national power grid that will allow North Carolinians to buy their energy from anywhere in the country, will pose a real problem for

utilities based in this state. These utilities have stepped forward recently to solve environmental problems, but not all utilities in other states in the region have

taken comparable steps. As a result, North Carolina utilities will be attempting to sell electricity at rates above those of utilities in other southeastern states, and the public will vote in the market. State legislators should consider whether and how to support national policies aimed at leveling this playing field.

The state. The state government is quickly creating policies directed at the parts of the climate change problem it controls directly. The largest step has been the formation of the North Carolina Climate Action Plan Advisory Group and the North Carolina Legislative Commission on Global Climate Change, which are considering a series of strategies:⁵

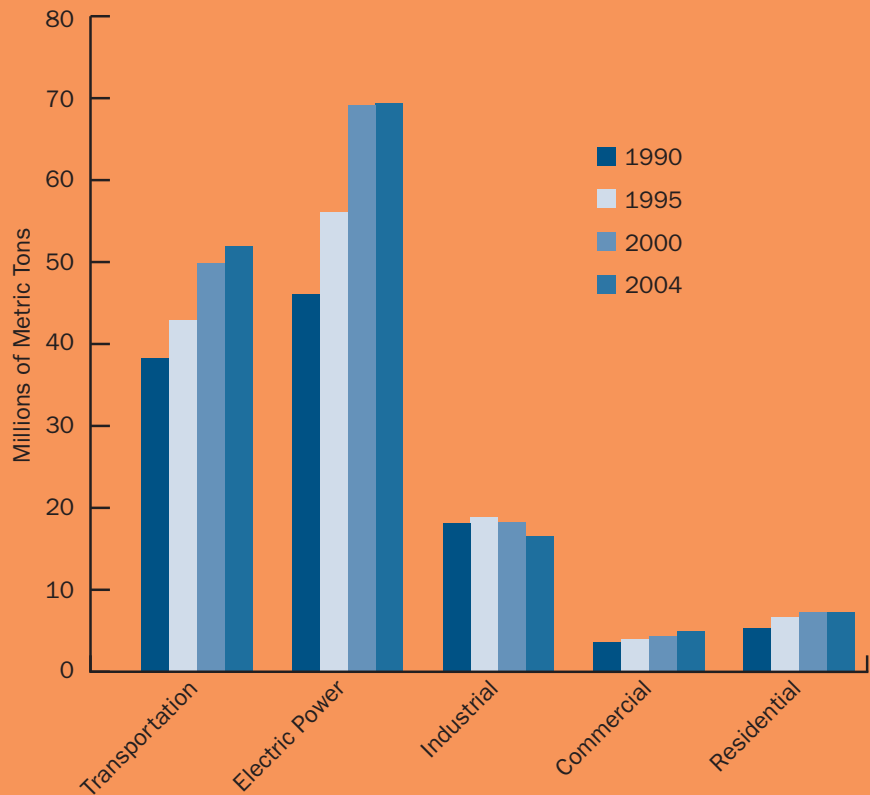
- A Renewable Energy Portfolio Standard (REPS), which now has been passed by the legislature, requiring that about 12 percent of the state's energy be supplied through renewable sources that reduce the effective emission of greenhouse gases either by using wind and solar and hydrological resources or by recapturing emissions in new plant growth in biofuels. There would be some allowance for improvements in energy efficiency as a way to meet this goal.
- Tightened requirements on the energy efficiency of state buildings, including those of the school system, which can reduce their energy use by 25–50 percent.
- Stimulation of the biofuels industry, which is both an environmental and an economic boon if done correctly (that is, without adversely affecting air quality in the state, given that many biofuels increase the amount of ozone).
- Changes in the building codes to require high efficiency in all new buildings constructed in the state.
- Provisions for increased public transport that will reduce the number of miles driven in personal vehicles in the state.

Communities. The amount of energy consumed depends critically on the design of communities: how they are laid out over the landscape, how they are

Aspects of Energy Use and Capacity in North Carolina

Dennis Grady and Jason Hoyle

Chart 1. Carbon Dioxide Emissions in North Carolina, by Sector, 1990, 1995, 2000, and 2004



Greenhouse gas emissions from energy in North Carolina were about 150 million metric tons in 2004, an increase of 35 percent from the amount in 1990. The fastest-growing source of greenhouse gas emissions was the electric utilities, with a 50 percent increase between 1990 and 2004. However, implementation of clean air requirements has resulted in little change in total greenhouse gas emissions by electric utilities since 2000.

Source: Data from U.S. Environmental Protection Agency, "Climate Change—Greenhouse Gas Emissions, Energy CO₂ Emissions by State," www.epa.gov/climatechange/emissions/state_energyco2inv.html.

connected by transportation systems, and so forth. More intelligent designs that group the locations that supply crucial human needs—housing, employment, shopping, and school—satisfy the same needs at greatly reduced levels of energy use. By properly co-locating places to live, work, shop, and go to school, communities can reduce their transportation emissions by 30–70 percent. In so doing, they can reach levels more typical of

European communities, which produce one-half to one-third of the carbon dioxide per person that typical American communities do.

Most North Carolina communities were born during the era of the car. Simply erasing these communities and starting over would not be sustainable. But as new development arises, it can be along the lines of sustainable development, and older communities can be

greatly improved by bringing in support services (shops, new businesses, and so forth) to enhance the existing layout. Again, the message of climate change policy is not that communities must stop meeting needs. It is that they must meet needs much more sustainably than they currently do. The main power of communities in this regard is in permitting and zoning, offering many opportunities to assist in the development and the redesign of North Carolina.

Communities will need partners at the state level, however, to accomplish such ambitious changes. For example, the Department of Transportation could work with these communities on the system of roads, using department funds to create not only new roads for personal cars but facilities for walking and biking.

Energy sectors. A community also may be thought of as an interacting group of energy users: residential, commercial, industrial, and transportation. In fact, the various scientific organizations, including the Energy Information Agency, organize their databases on U.S. energy use in this way.⁶ Effective policies can focus on any or all of these sectors, marshalling the sectors' resources to tackle climate change.

The most effective strategies at this level involve both the demand and the supply side. Utilities in North Carolina already are improving energy efficiency in their customers' homes and businesses.⁷ Their efforts will be much more effective if joined on the demand side by equally aggressive state- and community-wide campaigns to improve the efficiency of residential, business, and industrial-sector operations. Communities can identify "champions" that will mobilize actions within their sectors. For example, the Chapel Hill Restaurant Group has taken the lead in the commercial sector by building in Durham the first restaurant in North Carolina striving for certification by the LEED (Leadership in Energy and Environmental Design) organization. Similar champions are arising in every community of North Carolina, providing a base of business and governmental leaders who will help push through needed improvements.

Institutions. One of the most powerful ways to move communities forward

is to engage the institutions that are the major sources of greenhouse gases. In Chapel Hill, the municipal government has partnered with the University of North Carolina at Chapel Hill to form the first town-gown carbon-reduction demonstration project in the United States. Through this partnership, Chancellor James Moeser has set an ambitious goal of reducing campus emissions by 60 percent as of 2050, both by changing the campus infrastructure and by encouraging campus employees to reduce

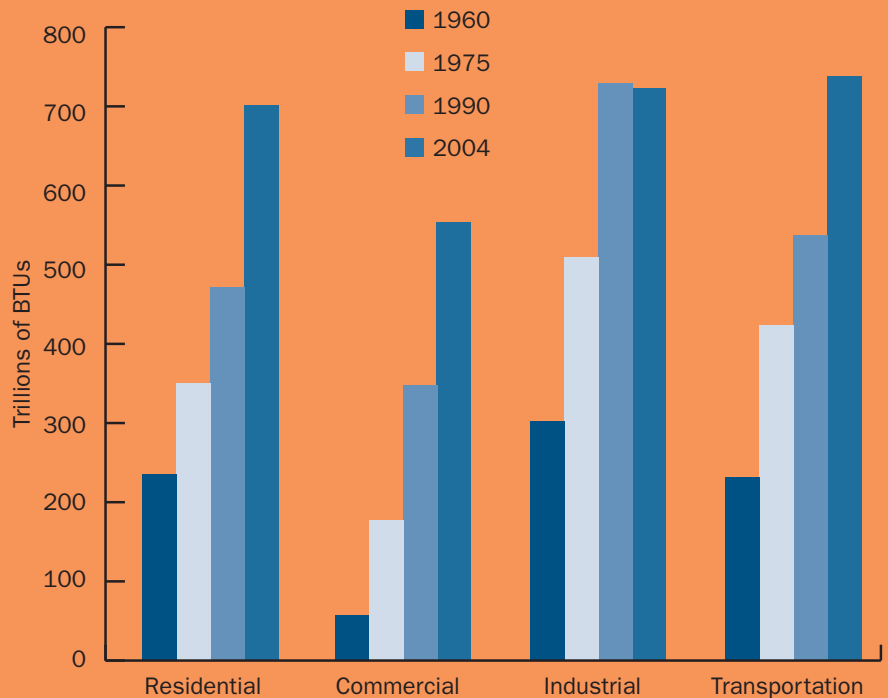
emissions in their daily lives. Further, town and gown have made the system of buses free, increasing bus ridership dramatically over the past several years. This change in turn has reduced emissions from the transportation sector.

Chapel Hill is far from alone on this front. Similarly exciting efforts can be found in Salisbury through the actions of Catawba College, in Boone through the efforts of Appalachian State University, and in other college towns. The university and community college

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Chart 2. Total Energy Consumption in North Carolina, by Sector, 1960, 1975, 1990, and 2004



Energy consumption in North Carolina rose at a compound annual rate of 2.7 percent from 1960 through 2004. Consumption in the commercial sector increased at nearly double the state's average, but the commercial sector remains the least-consuming one. Consumption in the residential and transportation sectors rose about 2.5 percent per year. In 2004, transportation became the leading energy-consuming sector in North Carolina.

Source: Data from U.S. Department of Energy, Energy Information Administration, "State Energy Consumption, Price, and Expenditure Estimates," www.eia.doe.gov/emeu/states/_seds.html.

system in North Carolina can become a powerful tool for moving communities forward as the campuses themselves adopt strategies to tackle climate change and reduce energy costs.

Individuals. At the base of the entire system of material and energy use in the state lie the consumers, the citizens of North Carolina. Like most other large environmental problems, climate change is most effectively tackled when it is understood as the responsibility of all parts of the community, including the individuals who ultimately drive the market through their daily decisions. To stimulate changes at the individual level, programs by the UNC Institute for the Environment, the Environmental Protection Agency, Environmental Defense, Duke Energy, and Progress Energy help consumers understand how and when they are producing greenhouse gases; how they can reduce the emissions through changes in their daily lives; where they can obtain the needed goods and services in their local communities; and how they can monitor their energy and material use so that they can see whether their actions have been effective.

Experience in the Community Carbon Reduction program suggests that even individuals who are committed to making changes in their lives to reduce carbon emissions quickly run into roadblocks in finding solutions and the resources to put the solutions in place. They do not know which actions are most cost-effective. They do not know where to find green goods and services. So the state must develop a system for informing the public about the ways to identify the most effective strategies for reducing emissions in daily life and for helping them find the resources to implement the changes.

A good way to think about the six levels of climate change strategies in North Carolina is that each level is both an actor and a stage. For example, the town of Chapel Hill and UNC at Chapel Hill produced a strategy (free buses) that is reducing emissions in the transportation sector. In doing this, they are

There is an emerging sense in North Carolina of the possibility of sustainable development and growth.



acting. But their actions also produce a stage on which individuals find it easier to use the option of buses. And what town councilor would continue to support a free bus system at the expense of taxpayers if individuals were not choosing to use buses? Those individuals set the stage (voting) on which the councilors will make their decisions.

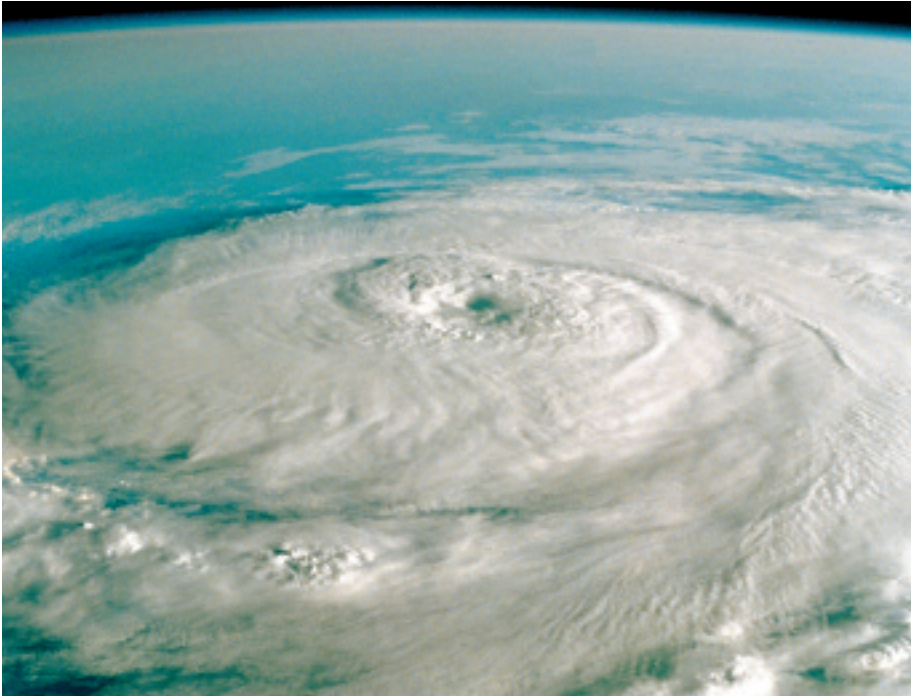
How Can Policy Makers Allocate Resources to Adaptation or Mitigation?

Policy makers in the state are faced with finding resources for three initiatives linked to climate change policy: (1) reducing greenhouse gas emissions, (2) increasing the ability of plant life to absorb those emissions, and (3) preparing communities for whatever climate change does occur despite best efforts to stop it. The discussion so far has focused on reducing emissions, the core strategy to ensure that greenhouse gases do not build up to unacceptable levels. This strategy can be enhanced through a statewide effort to conserve forests and cropland, such as the One North Carolina Naturally program of the Department of Environment and Natural Resources.⁸ By conserving and even regrowing significant tracts of land that have the capacity of absorbing and

sequestering carbon dioxide, the state can in part offset its emissions, with the bonus of using this absorption as a base of revenue in the emerging carbon market.

Running a program of conservation in the state is a real challenge. There are dozens of major conservation groups, each with its own interests: recreational land, farms, source water, and so on. Coordinating the efforts of the groups will allow their collective resources to be tightly focused on the lands that provide the greatest potential for carbon capture and sequestration (such as forests). Add to this an increased willingness of conservation groups to work with developers, and vice versa, and there is an emerging sense in North Carolina of the possibility of sustainable development and growth. Sustainability as a tool for preventing climate change recognizes that the goal of society is not to prevent development or conservation, but to develop where it makes sense ecologically and to conserve areas that are crucial for reaching the goal of sequestering carbon dioxide.

Clearly, though, despite the best efforts of society, some climate change will take place anyway because of the vast amounts of carbon dioxide already stored in the oceans and the soils from past emissions. Even if all human societies completely stopped all carbon dioxide emissions, the stored carbon would go back into the atmosphere and raise levels for at least the next 100–200 years (although to levels lower than



More violent storms may be a product of climate change.

what humanity will see if it does not stop the emissions). So at least some of the impacts of climate change are in North Carolina's future, regardless of the choices made now on reducing emissions or increasing sequestration.

How can the state's communities become better able to withstand these threats as they arise? Communities need better land-use policies to ensure that houses and businesses are not placed in the most vulnerable areas near the coast. They need better emergency plans for coping with storms, including working with the Department of Transportation on evacuation paths. They need a medical system prepared to deal with increases in heat waves or flooding or a rise in allergies, or at least a system alert to these issues and regular updates as situations arise. They need to begin linking their water systems so that drought in one part of the state can be solved by water flowing from elsewhere.

All of these are strategies of adaptation to a world that is not completely under society's control. They do not solve the problem of greenhouse gas emissions, but they do ensure that communities will remain around long enough to come up with effective solutions. Policy makers can begin a process now that will give North Carolinians the greatest chance of responding to the world when

it does reveal itself completely. As Dwight Eisenhower once said in a different context, "In preparing for battle I have always found that plans are useless, but planning is indispensable." The nation, North Carolina, communities, energy sectors, institutions, and individuals are rapidly developing such a planning process. Each of these players must determine how it will fit into that process, both as actors that reduce the threat of climate change directly and as creators of stages on which others will act.

How Can North Carolinians Set Priorities?

In the end, there is much to be done in North Carolina, with costs to everyone from efforts to stop climate change and from failure to stop it (potentially much larger). Both costs are large, so policy makers must not stumble too much at the beginning and must direct limited resources toward the most cost-effective solutions. Doing anything less will compromise the sustainability of North Carolina environmentally (with potential impacts of climate change), economically (with potentially reduced economic vitality), and socially (with the worst impacts—both environmental and economic—falling on those least able to bear them).

How can the possible policies be ranked? What will be the criteria, and how can a policy maker use them, given the newness of this enterprise?

The first step is to recognize that the state does not need a single ranking for *all* the policies. Some will be national policies, some state policies, some community policies, and so on. They are not necessarily drawing on the same pool of limited resources. There should be separate rankings for policies aimed at each of the six levels of actors and stages.

In some areas, multiple actors on multiple stages must make a full-blown effort, coordinated to maximum effect according to the needs, the goals, and the resources of the different players. Four such areas are, in no particular order, utility reform, energy efficiency, innovations in transportation, and community resiliency. Perhaps some readers will take on one or more of these as a personal challenge.

Utility reform. North Carolinians currently enjoy relatively low rates for electricity compared with the large population centers in the Northeast and California. This advantage has been a boon to consumers and manufacturers. However, many other states have significantly higher rates while maintaining a stronger economy than North Carolina does. Rates will undoubtedly rise in the future as carbon taxes kick in, making them better reflect the climate change impacts of energy production. With or without carbon taxes, rates will rise because of the REPS, but that rate increase is capped. The real question is whether it will be enough.

The rise will stimulate the market in green energy technologies, including the market in carbon taxes and trading mentioned earlier, although at a cost of rising prices for the goods produced through energy use. Absent such a rise in prices, however, the utilities have little incentive to invest in sustainable technologies and the infrastructure that must go along with it.

The pressure for a rise in prices is being met by a reform of the rules of the North Carolina Utilities Commission, allowing for considerations other than simply keeping rates as low as possible for consumers. Under a carbon-constrained economy, the Utilities

Commission will be called on to set rates that will both be affordable and lead to investments in sustainable energy technologies. This means that the price of carbon emissions will need to rise above \$50 per ton. Consumers can expect to pay more to manufacturers and retailers for goods. Their paying more may ensure that the people who are least able to afford rising energy prices (the energy poor in the state) are not unduly burdened.

Energy efficiency.

The energy system in North Carolina (indeed, in all the United States) currently uses only about one-third of the energy generated. The rest (more than 60 percent) goes to waste heat (such as heat from electricity transmission lines) that serves no human purpose. Improving the efficiency of the system could go a long way toward a goal of reducing emissions by 60 percent before 2050.

Groups and individuals, however, need to make the investment in energy efficiency, as European countries have done to great effect. This will require investments by energy consumers in more efficient home heating, lighting, and so on. It will require investments by the utilities in power plants and transmission and distribution systems. It will require a stimulus from the state government making energy efficiency measures mandatory, beginning with its own buildings. The utilities all have made a firm commitment to helping their customers improve efficiency (the “fifth fuel,” to use the words of Duke Energy), both as a way of satisfying the REPS requirements and as part of a load-leveling strategy (a goal of smoothing the demand for electricity across the seasons and the day).

Innovations in transportation. These innovations will be of two types: innovations in the vehicles themselves and innovations in the system of public transit. The kinds of vehicles in the fleet of North Carolina and the ways they are powered will see significant changes in the coming decades. There is merit in the idea floated by all the utilities to change the fleet of vehicles to plug-in hybrids. These hybrids store energy at night, when electricity is not needed for

many of the core uses and the price is low, and use it during the day to power vehicles. When there is peak demand, these same vehicles can be plugged back into the grid to offset the need for new power plants to “kick in.” This in turn will require significant investments in the technologies of energy storage, technologies being developed today in the state’s major universities and industries.

Even as the vehicles are improved,

however, a need will remain for a much better system of public transit, including regional light rail or guided buses, and significantly more opportunities to live in

communities designed for walking and biking. Then people will need to get out of their cars and use those alternatives.

Such a development may sound infeasible in a state designed around sprawl and the automobile, and boasting the most miles of roads per capita in the nation, but the state can no longer ignore this solution as roads become more clogged and people spend increasing numbers of hours trapped on highways. Businesses will support this movement, for it is their employees who are spending so much time idling in traffic and showing up at work tired and angry.

Community resiliency. As mentioned, climate change impacts will occur whether policy changes take place immediately or in the far future. Communities must be ready to respond to the changes, creating the networks of monitoring systems, alarms, evacuation plans, and emergency medical treatment to ensure minimal impacts when storms and heat waves associated with climate change hit. Responding will require a massive investment in the water distribution system, made all the more expensive by the fact that the current distribution systems in most communities of North Carolina are not only inadequate, but antiquated and failing. Such an investment will require that planners think deeply before allowing any new development in vulnerable areas that will be most affected by the extreme climate events that accompany climate change. It will no longer be feasible to build in these vulnerable areas, such as along the

coast, only to have the investments wiped out and new buildings constructed to repeat the cycle. The municipalities will, however, need support from a range of governmental and other partners to enforce the uses of zoning and permits that form the basic tools in this movement toward resiliency.

Conclusion

Many other policies could be described, filling the entire magazine. But there is no point in making more lists or developing further plans. What is needed now in North Carolina is a process of planning for the future that brings together all six levels of climate change actors and their stages, and that marshals the immense talents and resources in the communities and the governance systems of this state. The challenge is daunting, but the time to act is now.

Notes

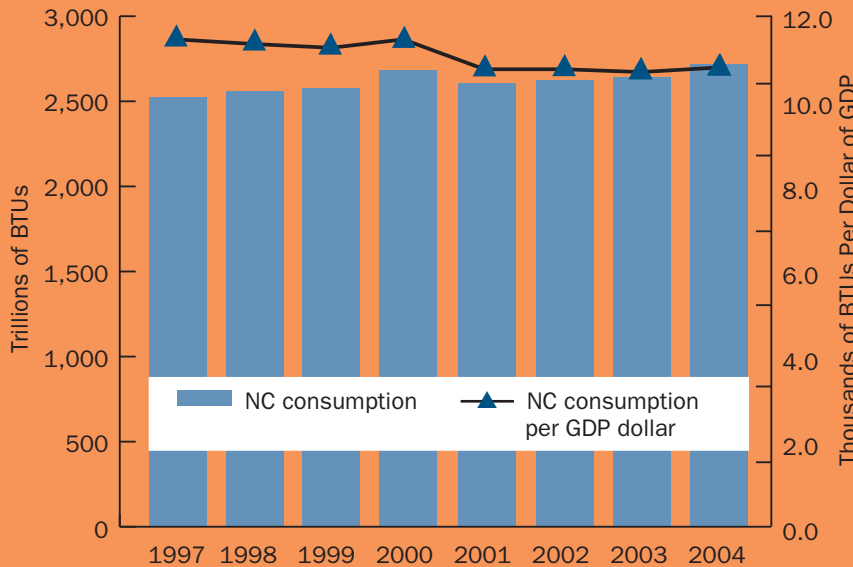
1. See Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report, Summary for Policymakers* (Geneva, Switzerland: Intergovernmental Panel on Climate Change, 2007), www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.
2. UNC Institute for the Environment, www.ie.unc.edu.
3. Okmyung Bin et al., *Measuring the Impact of Climate Change on North Carolina Coastal Resources* (Washington, DC: National Commission on Energy Policy, March 2007), econ.appstate.edu/climate/NC-NCEP%20final%20report.031507.pdf.
4. For a description of the Community Carbon Reduction Program, see the Institute’s website at www.ie.unc.edu/content/research/cred/index.html.
5. See North Carolina Climate Action Plan Advisory Group, www.ncclimatechange.us, and North Carolina Legislative Commission on Global Climate Change, www.ncleg.net/gascripts/DocumentSites/browseDocSite.asp?nID=14.
6. Energy Information Agency, www.eia.doe.gov.
7. Consider, for example, Duke Energy’s Fifth Fuel campaign on energy efficiency, described at www.duke-energy.com/investors/publications/annual/ar-2006/new-energy-equation/solving/fifth-fuel.html.
8. N.C. Department of Environment and Natural Resources, One North Carolina Naturally, www.enr.state.nc.us/officeofconservation.

Part of the challenge of energy demand and climate change is to build adaptable, resilient communities.

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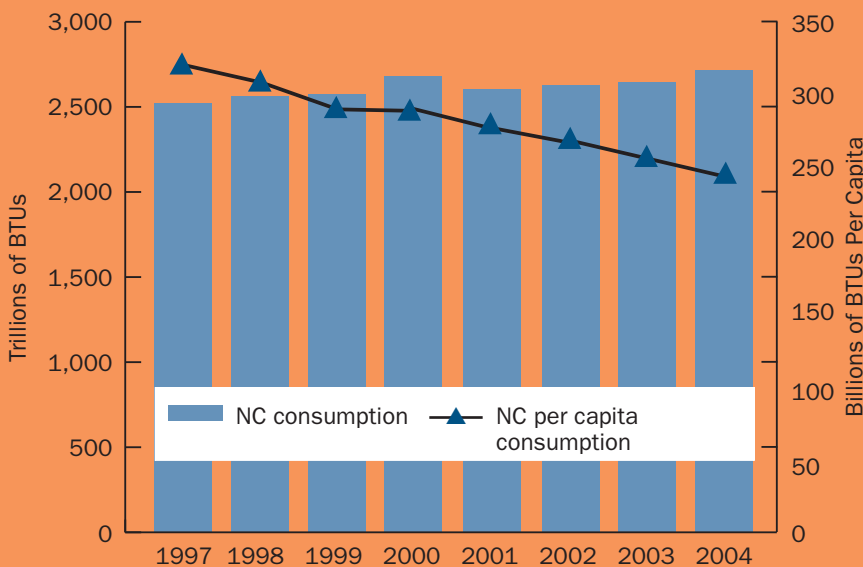
Chart 3. Energy Intensity in North Carolina (Consumption Per Dollar of State GDP), 1997–2004



North Carolina's total energy consumption increased from 1997 through 2004, but not as fast as its economy grew. With the exception of 1999–2000, the number of energy units (BTUs) used for each dollar of state gross domestic product (GDP) decreased, meaning that North Carolina's economy became increasingly less energy-intensive. The increase in energy productivity was largely due to the decline of the manufacturing share of the state's economy, from more than 26 percent in 1997 to less than 20 percent in 2004. During the same period, the economic shift resulted in greater output in the service sector, which uses considerably less energy.

Sources: Data on consumption from U.S. Department of Energy, Energy Information Administration, "State Energy Consumption, Price, and Expenditure Estimates," www.eia.doe.gov/emeu/states/_seds.html; data on state GDP from U.S. Department of Commerce, Bureau of Economic Analysis, "Regional Economic Accounts, Gross Domestic Production by State," www.bea.gov/bea/regional/gsp/.

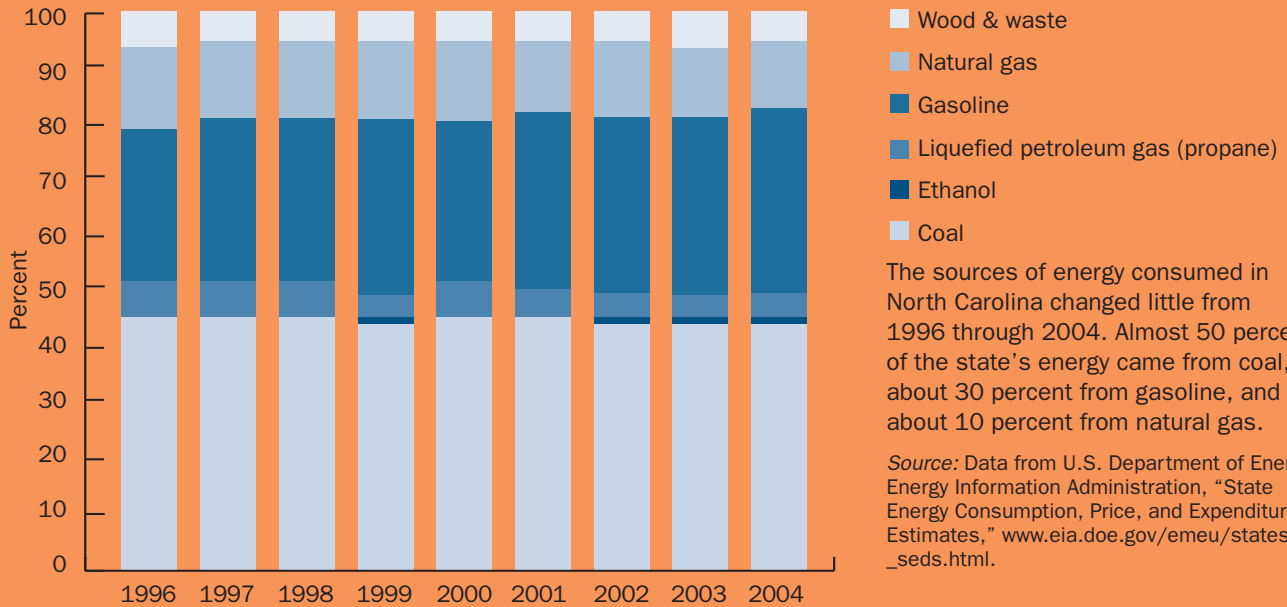
Chart 4. Energy Intensity in North Carolina (Consumption Per Capita), 1997–2004



Per capita consumption of energy in North Carolina declined by about 3.5 percent from 1997 through 2004, while the state's total consumption increased more than 7.5 percent. The increases in per capita consumption in years 2000 and 2004 were due to large increases in economic output and a corresponding increase in energy demand.

Source: Data from U.S. Department of Energy, Energy Information Administration, "State Energy Consumption, Price, and Expenditure Estimates," www.eia.doe.gov/emeu/states/_seds.html.

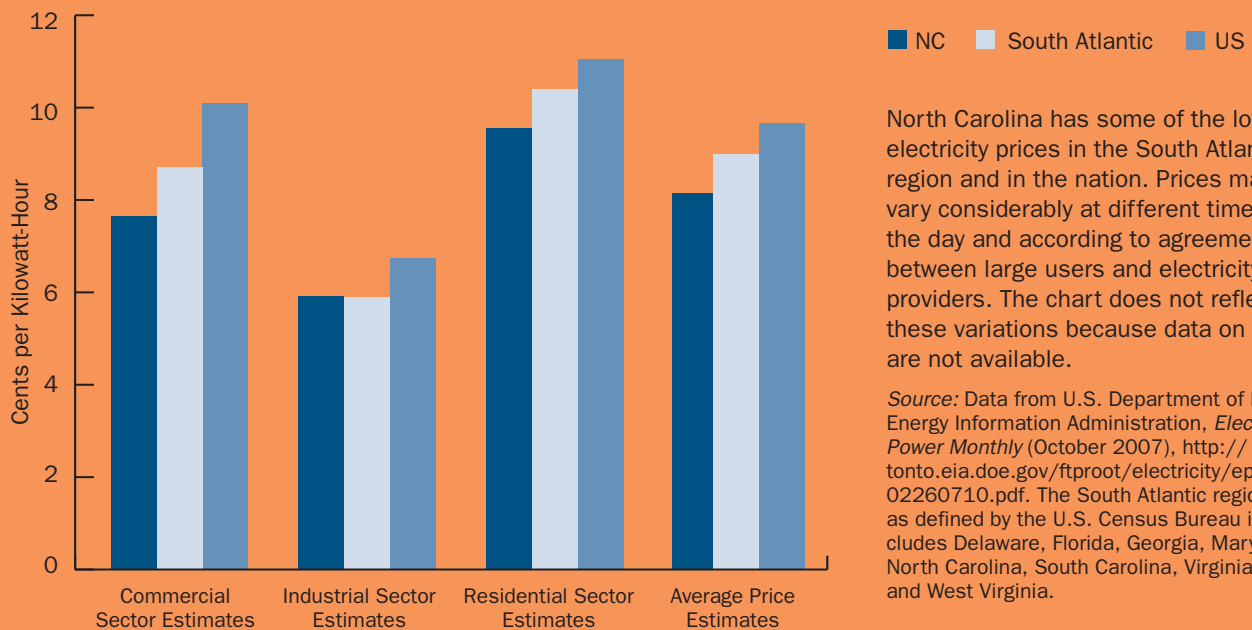
Chart 5. Energy Consumed in North Carolina, by Source, 1996–2004



The sources of energy consumed in North Carolina changed little from 1996 through 2004. Almost 50 percent of the state's energy came from coal, about 30 percent from gasoline, and about 10 percent from natural gas.

Source: Data from U.S. Department of Energy, Energy Information Administration, "State Energy Consumption, Price, and Expenditure Estimates," www.eia.doe.gov/emeu/states/_seds.html.

Chart 6. Electricity Price by Sector, North Carolina, the South Atlantic Region, and the United States, July 2007



North Carolina has some of the lowest electricity prices in the South Atlantic region and in the nation. Prices may vary considerably at different times of the day and according to agreements between large users and electricity providers. The chart does not reflect these variations because data on them are not available.

Source: Data from U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly* (October 2007), <http://tonto.eia.doe.gov/ftproot/electricity/epm/02260710.pdf>. The South Atlantic region as defined by the U.S. Census Bureau includes Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia.