

# The Energy Industry's Search for Greener Power

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Thank you President Ross. I am delighted to be here tonight to talk to you about energy and environmental issues. It's a tough assignment to talk about these issues on a Saturday night, and I want to applaud you for being here—particularly in the middle of March Madness. Maybe there's a certain madness with you to be here to listen to these tough issues, because they truly are tough issues, but they're the most important—in my judgment—some of the most important issues that our country can face and is facing today, and we need to find a way to get it right.

Because energy and environmental policies should be inextricably linked, and we should find a way to create a policy that is good for the future. And as I like to say, I hope—and working to shape the policy—that I pass what I call the “grandchildren's test”. And that is—and I have eight grandchildren—that the decisions I make today, when my grandchildren look back when they're my age many years from now, and they say, “My granddaddy made good decisions, and they're still good decisions today because he made the right trade-offs. He didn't do the short-term, best answer. He did what was best for the long-term.” And I think that is the great challenge that we all have in this country and each of you have as citizens—is to really understand, in a profound way, what the challenges are that we have and to understand them and help shape the outcomes for future generations.

I think it's important for us to have a really open and frank discussion. And I'll first kind of tell you a little bit about where—who Duke is. You think of us as the local power company, and we are and we're proud to have that role. But let me give you just a snapshot of our company framed in a broader context, so you can see the type of things that we are trying to do. We are one of the top five companies in the country any way you want to cut it, whether it's on generation or market total, enterprise value, etc. But what's most important is we're a company that provides electricity to 4 million customers, as such, we touch the lives of 11 million people in five states in the Southeast and the Midwest.

We're one of the largest generators of electricity from coal—third largest. We're the third largest generator of electricity from nuclear. We have the second largest hydro fleet in the country. And three years ago, we were not invested significantly in renewables, and today we have almost 1,000 megawatts of wind with \$1 billion invested. We just did our first major solar commercial project in Texas. And as you all here in North Carolina know, we were able to get permission, and we initiated it, to be able to put solar on the rooftop where we invest the money. We pay our customers to let us put it on the rooftop as if it's a power plant site. We operate it and maintain it and, at the end of the day, we don't charge more for it, we just roll it in and sort of socialize the cost with our low-cost coal and nuclear in the state. And to date, we will have invested \$50 million in 8 megawatts, and we have the ability to serve 1,300 homes just with solar.

We have one of the largest carbon footprints of any company in the country. When I travel around the world I tell people, “There's three numbers that define our carbon footprint—3, 12, 41. We're the third largest emitter of all companies in the U.S. Of all companies in the world, we're the 12<sup>th</sup> largest emitter. And if we were one of the 190 countries in the United Nations, we would rank 41<sup>st</sup>.

Having been in Copenhagen, we are not applying for country status. Having grown up in the 60s and having been in Copenhagen, I now refer to it as Woodstock for environmentalists. Anybody who went to the Bella Center would truly appreciate that observation. And I look across the room,

not many of you were at Woodstock originally. But my important point here is, I shared those three numbers with you to say this—we understand the magnitude and how daunting the challenge is to be able to make the transition from where we are today to a low-carbon future and we're clearly on that road.

Another way to think about our company is, of all of the companies in the U.S. and South America, we're the third largest producer of carbon-free electricity. And that's because of our nuclear and our hydro, our wind and our solar—all of that combined says that we're on the road to a low-carbon world. We're a company that's very focused on energy efficiency. We have proposed this new approach—a new paradigm in terms of how we are incented to invest in power plants, but we want to be incented to invest in energy efficiency beyond the meter in the same way. And we've really worked hard to get it adopted in the states that we operate in. Because, as I said earlier to a group, the most environmentally benign plant we can build is the one we don't build. And if we can invest in energy efficiency and we can help our consumers use energy in a more productive way—that will translate into savings to them in the future. So that's a quick snapshot of who we are.

What I'd like to do now is walk through a set of issues that I think are really important for you to keep in mind. One is to recognize that out of crisis always comes opportunity. The recession has given our nation a golden opportunity to address our economic and environmental and energy challenges simultaneously. Our industry is at a crossroads. Do we use this opportunity to stimulate the economy, to create jobs, to repower local and national economies, and reduce emissions? We could do that. We should do that. Or do we squander it and maintain the status quo? That, in essence, is a conversation I would like to have with you all tonight. As I stand here tonight, we're at a point that is probably the most transformative point in recent times for our industry. Not since the early part of the 20<sup>th</sup> century where we started down the road to provide universal access to electricity to all Americans, are we at such a pivotal point. We stand here today recognizing that our task is to repower America. We need to rethink, redesign, and rebuild our power structure.

In some senses of the word, age has caught up with us. Look across the country. There's over 320,000 megawatts of coal plants. One-third of those plants have never been retrofitted for sulfur dioxide, nitrogen oxide or mercury and are 50-70 years old and need to be retired and replaced. Our distribution network is becoming obsolete in this digital age. And one of the great challenges that we have in front of us is to embrace technology, to transform the regulatory paradigm, and to have clear environmental rules that give us a road map going forward.

In our search for greener power, my comments tonight will discuss and focus on three broad drivers. And these are unprecedented changes in our industry. First are federal and state policy changes, second is transformative technology innovations on both supply and the demand side, and the third is our 2050 mandate. Simply put, except for our hydro facilities, virtually every power plant that we operate today will be retired and replaced. Think about how liberating that is on some level. That's like having a blank sheet of paper to build the power generation that we want to have by 2050?

More about the three drivers in a moment, but let me put the drivers in the context of my job. Job one for me is to provide my customers with affordable, reliable, clean electricity 24/7, 365 days a year. The toughest challenge is to balance these goals. Flipping a switch is pretty easy when it compares to having to do the trade-offs between, “Do I pick something that’s more affordable, but not as clean? Do I pick something that is much cleaner, but not as affordable? Do I pick something that’s cleaner, but not as reliable?”

Those are the type of trade-offs, and they are very complex trade-offs that we have to make—particularly in the context of redesigning our system. If you put it in the context of fossil fuels, whether it’s coal or gas, we have to find a way to take carbon dioxide (CO<sub>2</sub>) out of both of those fuels. We have yet to find a way. That is a challenge. Renewable fuels are more expensive, they supply power intermittently—I mean—when the wind blows, you get electricity. When the sun shines, you get electricity. But when neither happens, you’re in the dark. And so one of the challenges is, do we marry it with batteries? How do we do it? How do we find a way to accommodate those sources in the grid? The other thing is, is—and we talked about this earlier today—is energy sprawl. Let me give you some interesting statistics. I can put a 1,000-megawatt nuclear plant on a third of a square mile. That’s 1,000 megawatts. To get 1000 megawatts from wind, I’d have to put wind on 200 square miles. To get 1,000 megawatts from solar, I’d have to put it on 50 square miles. So again, it’s a landscape issue. It’s a use-of-land issue. And so that’s just another thing that we have to factor in.

Let me quickly jump back to the 20<sup>th</sup> century. When we started down the road to provide universal access, which we achieved, we tried to do it in a reliable way, and today we provide electricity 99.99 percent of the time. The real price of electricity has been flat for 50 years. I mean—can you imagine anything that’s been flat for 50 years, in terms of price? But we cleaned up the air. Go back to Pittsburgh or Cleveland or Detroit in 1910 when people were burning coal in the fireplaces and wood in their fireplaces and kerosene lights. Quite frankly, I can’t remember all those. Some days I feel like I should be able to remember. But the fact of the matter is that was a period in time when the cities were terrible to live in. But by electricity we were able to reduce and clean up the air. And since then we’ve had the Clean Air Act of ’70 and Clean Air Act amendments of ’90, and the consequence is we’ve cleaned it up even more—particularly coal.

In the 21<sup>st</sup> century, I believe that we have two mandates: I guess I’d call them aspirations. One is—and this goes to the 2050 mandate—one is, is that we need to modernize and decarbonize our fleet. There’s only five ways to make electricity. Energy efficiency I count as one way. Renewable solar and wind is another. Coal, gas, nuclear—each has pluses and minuses. Each, at the end of the day, needs technological improvements to play—to be an equal contributor in a low-carbon world. And so we, at the end of the day, have to find a way to either advance the technology, or to come up with the right mix as we modernize and decarbonize.

Every decision we make today is a major capital decision. Coal plants are \$2 billion or \$3 billion. Nuclear plants are \$10-12 billion. These are significant capital investments. But more importantly, they’re going to be here 50-60 years. So when we look out on the horizon and build a plant, we look at what the world will look like in 2050, because at the end of the day, that plant will be operating then, and we need to mix our generation in a way that allows us to be able to provide affordable, reliable, and clean in 2050 because it will come from those plants.

The second aspiration is to make our communities the most energy efficient in the world. What does that mean? What it means is this—even if carbon was not a problem—carbon is a problem and it needs to be addressed. Even if it weren't a problem, this should be our aspiration for the 21<sup>st</sup> century, but let me tell you why. Because today there's 1.6 billion people that have no access to electricity, no access to the modern world, no hope for their children to be able to use computers and be able to contribute in the same way that our children have the ability to access information and knowledge and communication. Also, between now and 2050, the world population is going to go from 6.5 to 9 billion.

Think about the infrastructure that will have to be built to provide electricity to them. So even if carbon wasn't a problem, there's going to be a battle over scarce resources. And we should have as one of our aspirations to make our economies the most energy efficient because, at the end of the day, the highest probability of the standard of living going up for our children is if they live in a world where their economy, where their community is the most energy efficient.

Think about that point for a moment. Because even without carbon, I think that has to happen. That has to happen because we need to be focused on changing the regulatory paradigm. The regulatory paradigm we have today is we sell kilowatt hours. We make money selling kilowatt hours. We make money building power plants. So we have to change it so we get compensated for investing in energy efficiency. We have to change it so we have the equal capability to invest in new technologies that are coming in on the horizon.

The other thing that I think is very important is that we have already started down the road of changing and modernizing our system. As I mentioned earlier, there has been a little controversy around Cliffside. It's actually created some visitors to my front yard, and I was delighted to have them there. I just wish I would have known they were coming. I'd have served them coffee or tea. Although, I'm not sure my neighbors find me as the perfect person to have living on their street now. But the fact of the matter is, Cliffside is a more efficient plant. It is a bridge plant. It's 825 megawatts, has a lower SO<sub>2</sub>, NO<sub>x</sub> and mercury footprint. It allows the shut-down of 1,000 megawatts. We have a coal-gasification plant that is the hope for the future in Indiana with a potential carbon capture sequestration. That will allow us to shut down 500 megawatts of unscrubbed coal units.

So, in a sense, we're starting on the road. Because in the next decade, we will probably shut down 5,000 megawatts of old coal plants that we own. The sooner we get started we're able to smooth out the cost impact on consumers. And there's no better time to raise money at such low rates, because the cheaper the money is, the lower the price increases. And in the last two years, we've raised \$7 billion in one of the toughest capital markets at about 5 percent with good maturities. So from a customer standpoint, the fact that we have started down the road of modernizing our system will help us achieve affordability objectives in the future.

Let me kind of mention a couple other things. One is, there's a lot of talk today about shale gas. They call it a game-changer. Let me say that—in my judgment—the jury is out with respect to shale gas. First of all, in the last 10 years 90 percent of the power plants we built in this country have been gas-fired plants. I laughingly refer to them as the crack cocaine of our industry. First of all, it's a low capital cost to build them. They produce electricity, but require a volatile fuel, natural gas, to make them run.

And if I look back over the 35 years of my career, I see gas prices have been incredibly volatile during that period of time. Some are saying that shale gas is the answer, and that we ought to convert all our coal plants to gas. If we did that, we'd only cut our carbon footprint 50 percent. That's not enough to achieve the Waxman-Markey objective of an 80 percent reduction of CO<sub>2</sub> by 2050.

So natural gas only gets us part of the way there. It will be a bridge fuel. It will play a key role, but here's the risk. Shale gas requires tremendous amounts of water to be used for the horizontal drilling or "fracking" or "hydro-fracking" to drive the gas out, and you have to use chemicals with the water. It releases methane. And at the end of the day, there are huge environmental issues. The EPA just announced last week that they're going to address fracking, so more to come with respect to environmental impact. But even if you went to gas and you couldn't get all the shale gas you predicted, your fall-back is liquefied natural gas. And we have terminals that we can bring it on board. My belief is that you then have tied the commodity pricing of gas to the world oil price. And at \$80—you don't like that price? It could be \$120 and you really won't like that LNG price.

But here's the important footnote. When you bring LNG into this country at much higher prices than producing it here, it has 70-80 percent of the carbon footprint of coal because by the time you liquefy it, you transport it, and you regasify it, it drives up the carbon content of that process of bringing it onboard. So I am very reluctant, as some are, to suggest that we ought to put the natural gas needle in the other arm, because we put the oil needle in this arm in the '60s and we're spending \$400 billion a year for an addiction to oil from people that are not our best friends. And so, to me, we need to be thinking about how we produce electricity within our country with our resources that we have.

Let me now turn to the three major drivers, because I think it's very important. The first driver is federal and state policy. I believe environmental regulations are really key. I have, for a long time, called for regulation of carbon. I personally believe that capping trade is the right approach, because it allows you to help those who are dependent on coal to make the transition. I think that's very important, and we can—I can talk more about that if you're interested in that. I don't think we'll get legislation this year, but we might start. I think in all likelihood it will happen and probably next year, which means we have to start all over in the House.

But, I believe there will be significant regulations on SO<sub>2</sub>, NO<sub>x</sub> and mercury from burning coal. And at the end of the day, what I would like to see if I was king of the world, is a clear road map that tells me what the carbon rules are going to be, tells me what the pollutants rules of SO<sub>2</sub>, NO<sub>x</sub> and mercury, and tells me what the rules are on ash ponds; tells me what the rules are on discharge of water from power plants, tells me what the rules are on mountaintop coal mining, so I can make an informed decision about what I build. So I'm one that's calling for the government to act. Put the rules in place so that we can go to work, raise the capital, redesign our system, repower our system, and put people to work.

Now, a friend of mine said, “Rogers, why should you hurry up and try to do that?” Because an unintended consequence of the recession—and environmentalists don’t like to hear this—but when you compare the emissions of carbon in the United States from ‘08-‘09, it dropped 6 percent. It will be four years, based on the anemic recovery of our economy before we’ll be back to the same level of carbon emissions as we had in ‘08. So while we—you know—it’s kind of a false positive on one level, but also the unintended consequence of that recession has bought us some time to make sure we can get this right going forward. And I believe that it’s very important that we get it right and we do it in a comprehensive way. I think renewables will play an important role going forward.

Twenty-eight states have renewable energy portfolio standards. I think they’re very important. There are tax incentives, and that will continue to happen in going forward. The other thing the government’s doing as public policy is they’re trying to use stimulus dollars and funding to subsidize technology change—the smart grid and carbon capture and sequestration, and they’ve absolutely created an organization very much like the Defense Department called the Advance Research Projects Agency-Energy or ARPA-E, where they’re pouring money into batteries and other technologies. I think it’s very important for them to do that research and development. So the first major driver is federal and state public policy development. We need the rules, we need the road map, we need the certainty, and with that we will go to work and come up with the solution.

The second major driver I would share with you is technology. That has the ability to transform our industry. *Technology Review*, which is a publication produced by MIT, in their April issue said seven of the top 11 of the 50 most innovative companies relate to energy—batteries, super conductivity and transmission, solar, smart grid, electric vehicles, other solar companies. So think about the amount of innovation and IQ and money going into development of these technologies. All of which will transform our industry. *Fast Company Magazine* said two of the top 10 were energy related—of the 50 most innovative companies. Interestingly enough, one of those was a utility, and in a sense—I’m not going to name it. It wasn’t us. It should have been us. But the fact of the matter is we started as a high-tech company in the early part of the 20<sup>th</sup> century, and my prediction to you is, by the deployment of technology, we will become a high-tech company in the 21<sup>st</sup> century.

The other important part of technology is really about what is going on in China. We have entered into memorandums of understanding with three different Chinese companies. We’re talking to four or five different ones. And you go, “Well, why would you look to China?” And the answer’s pretty simple. They’re number one in the world in solar panel production and wind turbines. They’re number one in the world in building nuclear plants. They have 13-14 nuclear plants under construction with 10 more are on the drawing board. They’re number one in the building of coal plants. They’ve been bringing a new one online every other week. They are number one in the roll-out of smart grid. Because they’re building new cities, and so they’re using raw earth and doing it the way it should have been done if we have had the technology in the 20<sup>th</sup> century. It will teach us how to retrofit our existing system.

Going forward there are lessons to learn. But the reason that we're there, is because we believe that they will scale the technologies faster than we will in the United States—particularly on carbon capture sequestration. And the sooner I know whether or not CCS can scale or not and whether it makes economic sense is really critical in terms of making decisions, because if you can't scale CCS—that basically says unless you come up with some other technology to take carbon out of coal—that says that nuclear will trump coal by 2050. And my personal belief is solar will trump wind because it can be distributed in nature and you don't have to build thousand mile long transmission lines to get it to market. So we're working very hard with the Chinese.

And let me tell you one other thing. I spent a lot of time in Europe and Copenhagen talking about climate and the work that's going on, and the truth of the matter is the Europeans have really led with the Kyoto Treaty and the things they've done. But in a sense, when I deal with the Chinese, they remind me more of us than our European ancestors because I think our European ancestors and we are increasingly becoming more of the chattering class—we talk a lot about it—rather than the can-do class. And the Chinese have a can-do spirit and a metabolism and a drive and a determination. And what I want us to do as a company is to take advantage of their imperative to build. As they move people to the rural areas as we did in this country in the 1880s and the 1890s to the 1940s, they are building out an infrastructure and they're scaling it in a way that, at the end of the day, we can take advantage of it. Because when we build and rebuild our system here, at the end of the day, my objective of being affordable increases significantly as a consequence of that.

So, we think that the Chinese will play a very important role, but what plus to the Carolinas—particularly in the greater Charlotte area, or as I said earlier, this is the greater Davidson area and I live in Charlotte on the outskirts of it. But in this area we're building an energy hub. Think about it. AREVA, Siemens, Toshiba, Shaw—just to name a few major companies. And Siemens just announced putting a new manufacturer in the southeast for gas turbines to hire 600 people.

So we're on the way to building the infrastructure here, and anybody that studied Michael Porter at Harvard understands cost or cities and how iron against iron creates innovation and creativity. Look at the two banks in Charlotte. They competed with each other and went to the top of the class. We think if we create an energy hub, we have the ability to do the same thing with the companies that are working there. But let me talk about energy in another way. There's an incredible amount of technologies coming on the market, and let me just quickly give you the funnel. We lead the chief technology officer in '07. In the last two years we've looked at 900 different technologies. We've done deeper dives on 250 of them. We've tested the products of 100 of them. And today we're doing five pilots—major pilots—and we've got five strategic partners. We've used this funnel to really focus on what could really create value for us, because we believe that the second driver is technology.

The third driver is the need to retire and replace. And I've talked a lot about that. We're in the process of doing that now. But let me close with this point. We need energy and environmental policy. That is critical. We need to create an environment for technology to flourish. In a sense, I think of our company as a distributor of new technologies in many ways—an implementer, a tester. We use our system as a beta site. We also recognize that we have to retire and replace, and that reality is right in front of us, because it's almost as daunting to do that in the next 40

years as it is for the Chinese to fill the nuclear demand. So, in that sense, we share that in common.

But what's missing? And I think this is why I'm delighted to be here tonight. Is that we need to connect the dots. We need to connect the dots between energy, environmental issues, and the economy. We need to connect those dots. We can't afford to think linearly. We need to think holistically in terms of how these pieces fit together in the future. And we must address all these issues contemporaneously. And we have to take a portfolio approach. We can't take anything out of the equation.

We've got to be optimistic that we can do this, but we also have to be pragmatic by following a realistic road map. I would say that, at the end of the day, our challenge is simply this, and that's why I think we need to seize the moment of this recession. I think about the level of our national debt—\$14 trillion. I look at our national deficit of roughly \$1.3 to \$1.4 trillion. And I look at the stimulus dollars, which, quite frankly, have not created the private sector jobs. They've kept people in their jobs in state and local governments, but they haven't created private sector jobs, which gets our economy going.

I look out over the next five years and there's a correlation between growth in GDP and electric sales. Economists say we're technically out of the recession, but for the next five years our economy is going to be very anemic in its growth. What does that mean? It means unemployment is going to be at 8-10 percent for five years. I hope not. What that means is the underemployed could be 15-17 percent. And that's why I stand here tonight with a sense of urgency about getting the policy in place to deploy the technology to go to work on this mandate to retire and replace. Because we need to reframe the carbon issue and the environmental issues to say, "Put us to work. Let us raise the capital." Don't raise the national debt. And we will rebuild our system. And we'll do it in a way with a smaller carbon footprint. We'll do it in a way with greater energy efficiency in our communities. We will stimulate the economy. We will create jobs. It will lead to greater energy security in our country. It will lead to cleaner air, including less carbon emissions.

That's the mission that we have. That's why our industry is in such a transformative period. And I want our industry to seize it and take it and lead, because if we do that, we help get our economy out of the ditch. We help find a way to get our mojo back with private jobs, private sector investment and at the same time, we clean up the air.

Thank you all very much.

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