Why Coal and Natural Gas Will Remain in the World Energy Mix

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Thank you very much, David (Hardesty).

It is always great to be on the WVU campus, especially during football season. There is something in the air that makes this a special place to be. As President Hardesty said in his introduction, I am a fourth-generation coal miner. My own career in mining began in the early 1970's, and during that time, I have seen huge changes in the industry. And what I haven't witnessed firsthand, I have heard from my father or his father.

In fact, my father, who is 88 years old, still keeps up with what is happening in the industry, and doesn't hesitate to offer advice when he thinks I'm going down the wrong path. What I value most from talking with him is the perspective that he gives me. I can see through his eyes, as well as mine, how far we have come as an industry.

Look at the advances in mining technology and mine design – much of that work done by WVU grads working for CONSOL. Better pillar design, improved seam degassing techniques, better and safer equipment designs, increases in productivity and huge improvements in systems monitoring.

Consider, for example, that we now have the ability to monitor, from our headquarters in Pittsburgh, carbon monoxide readings from a sensor on a belt roller at our Robinson Run Mine, in Shinnston, located 800 feet underground and more than 100 miles from our office. Technology advances like this not only give us a redundant set of eyes to monitor our systems, but, more importantly, allows us to detect and correct a situation before it become a problem.

Technology like this allows us to be more efficient and productive, but most importantly it allows us to be safer. In my view, a company has no higher obligation than to provide a safe work place for its employees.

Of course, safety has a cost. We expect to spend as much as $45 million through the end of 2009 on the equipment-related requirements of the new federal and state safety statutes, including the replacement of seals in abandoned areas, and the additional employees needed to meet the new training and testing requirements.

Despite the cost in dollars and in management time, ensuring the safety of our employees is our number one priority. Making mines safe is not just a matter of spending money. The underground environment is constantly changing. Proper planning, continuous observation, and immediate correction of potentially unsafe conditions all are essential to the prevention of accidents.

There is a human element to all of this that is an essential factor in the safety equation as well. The best engineered mine, or the most modern equipment mean little if the people who work in the mine are careless or unfocused. Without attending to the human element, no safety program will succeed.

At CONSOL, we emphasize the importance of safety to every employee through training and through activities that continuously create safety awareness. We have built several new training centers that allow us to provide year-round training for both current and new employees.

The physical and human elements of safety are not management's responsibility. They are not the employees' responsibility. They are EVERYONE'S responsibility -- from the miner at the face, to the accountant at headquarters, to me. We are all responsible and we are all accountable for the safety of ourselves and that of our fellow employees.

Our goal is ZERO Accidents. One of our young interns this summer asked whether I thought CONSOL could actually achieve zero accidents. His preconception was that ZERO was a nice idea, but not a very practical one.

My answer, though, to the question was yes. Yes, we can achieve zero accidents. We have a number of operations already there. When you look at the numbers, you recognize how close we are to zero throughout our company. Ninety-eight percent of our employees will work accident free in 2009. That's a substantial number. But it is not the right number. The two percent who get hurt are not just a statistic, they are part of our company, they have names, and they have families. Our mission is to see that no one gets hurt.

The success of our mission requires the constant melding of the science of safety with a culture of safety. When science and values come together, we are at zero.

The science of safety is often what we engineers are best at. The science of safety is technology-driven. It is design-driven. We use technology to help us monitor conditions, to provide early identification of problem areas, to improve communications between sites underground or between the underground and the surface, and to enhance the safety of equipment.

By deploying technology, we can minimize physical conditions in a mine as a source of accidents. We are great engineers, and we intend to engineer our mines so that the physical conditions in the mine are as predictable as those inside this room.

But what you and I must be good at -- the thing at which you and I must excel -- is creating a culture of safety in the operations for which we are responsible.

A culture of safety involves not only giving employees the right tools with which to do their work, but engaging their minds as well. It requires us as leaders to inspire employees to make safety their core value.

You do that in many ways: with constant training regarding safe work practices, with regular discussion of safety issues -- both at work and at home, and with programs that acknowledge and reward safe work practices and safety achievements. Most importantly, you do it by establishing zero accidents as the only acceptable performance. You start with the premise that our normal state of operation is no accidents. An accident is an abnormality that is unacceptable. And you start with yourself as an example.

This approach means safety trumps everything else we do. It trumps production, it trumps profits, and it trumps all other rules, policies or procedures. It requires us, as leaders, to empower every employee, whether hourly or salaried, to stop the normal course of operation if he or she believes that safety is being compromised. Finally, such a culture must require that every employee be accountable for his or her own safety performance. We must expect that of every employee and we must consider it a condition of employment.

I also wanted to come here today to talk about energy; I wanted to talk about energy here in West Virginia, America's Energy Hub; and I wanted to come to WVU to talk to engineers about energy.

Why?

Because I believe that the debate about energy occurring today in America -- and around the world -- will be a defining issue of this century; because I believe that West Virginia has something to say in this debate; and because I believe that engineers, like you in this room, will be the ones who will solve the problems and pave the way for the 5 billion inhabitants of our planet to have the energy they need to live safer, healthier and more productive lives.

Energy is critical to human progress. While here in the United States, we may take it as a given, study after study shows that access to electricity is linked to human well-being. As access to electricity increases, life expectancy increases, access to clean water increases, nutrition improves, and educational levels rise. Yet access to electricity is something that many in the world do not have.

Today, there are more than 1.5 billion people who don't own a light bulb, who get from point A to point B by walking or riding a bicycle or an animal, and who cook their food burning wood or animal waste.

As the world's population grows and as the desire to live a better live grows, particularly among those 1.5 billion people, the demand for energy will grow – because it is energy use that is most closely associated with the likelihood that a person will live a longer, more healthy and more secure life.

At the state, national and international level, we are engaged in a debate about climate change. It is a debate about how we produce our energy, how much we should use, and how we should control the consequences of its use. As the debate unfolds, we need always to keep in mind that, without energy, life can be harsh, brutal and short. Without adequate energy, human potential is arrested. Without energy, life is little more than a struggle for survival.

We also need to keep in mind that ours is a carbon-based world. We are carbon-based animals and most of the energy we use comes from the combustion of carbon. As a consequence, a debate on climate and the control of carbon can have far-reaching consequences on the way in which we live our lives.

So, let's begin at the beginning, and ask the simple question: How much energy does the world use? In 2008, the world used an estimated 453 quadrillion BTUs of energy. For comparison, a ton of West Virginia coal contains about 25 million BTUs. So to meet the world's energy needs solely from West Virginia coal, we would have to mine about 18 billion tons per year – 108 times what we produce each year and 18 times more than the entire U.S. coal industry will mine in 2009.

Most of that 453 quadrillion BTUs – 81% -- came from fossil fuels – oil, coal and natural gas, in that order. On a global basis, nuclear energy accounts for 6% of world energy consumption while 13% comes from renewable sources – most of which is hydroelectric.

Over the next twenty years, according to the U.S. Department of Energy, world energy demand will grow 55%, to more than 700 quadrillion BTUs per year. That is not surprising when you consider that the Census Bureau projects that global human population will be more than seven billion.

What IS surprising about the DOE estimate is that they also predict that the demand will be met primarily by fossil fuels. Even 20 years from now, their estimates suggest that the mix of energy sources the world will use to meet its energy needs will be essentially identical to the mix of energy used in 2008. It will be a mix dominated by fossil fuels. Twenty years from now, the world will still depend on carbon-based energy to meet its needs.

This is the central thesis of my remarks.

Fossil fuels, including the coal and natural gas that America and West Virginia produce in abundance, will remain as vital in 2030 as they are today.

Of course, in the debate on energy and climate, there are those who not only demand that we reduce our use of fossil fuels, but argue that making those reductions will be relatively easy and

painless. I submit that they haven't looked at the size of our existing energy system nor have they fully appreciated the magnitude of the challenge in altering that system.

The production, processing, transportation, conversion and consumption of fossil fuels in the world, or here in the U.S., represents an enormous integrated delivery system, the construction of which spans several centuries.

We started mining coal in this region in 1750. The first oil well was drilled 150 years ago last month. The first crude oil pipelines in the area were built in 1865. The first long distance pipelines for compressed natural gas were laid in 1872. And a Westinghouse engineer in Pittsburgh built the first practical electricity transformer in 1885. Not only is our fossil based energy system long-established, huge and complex, it also represents an amount of invested capital that is nearly incalculable.

It is fair to say that this energy system is akin to a huge ship at sea. It can change direction, but it cannot change direction quickly.

We can integrate new energy sources into the system, but only if investments in infrastructure are made. For example, we may be able to increase the amount of wind energy we produce, but only if we concurrently build thousands of miles of new transmission lines to move the energy from where it is produced to where it is needed, and only if we build the backup fossil generation to account for the intermittent nature of the wind.

We can integrate different energy sources, such as hydrogen, but only if consumption technology is developed to create the market, and only if the supporting delivery infrastructure is built.

What we can't do is make a wholesale substitution of things like wind or solar energy for fossil fuels in a period of a few decades. The transition will be too abrupt; the cost in stranded assets and new infrastructure are too staggering; and the likely shortfalls in energy are too great.

If we look for a moment just at electricity, 70% of U.S. electricity comes from coal and natural gas, both, by the way, produced by CONSOL here in West Virginia. Solar and wind combined account for less than two percent, slightly more electricity than we get from burning wood.

There are enormous technical, logistical, social, economic, and environmental challenges to replacing fossil fuels with renewable energy as quickly and as extensively as the most ardent supporters of renewable energy would have us do.

I know some may consider the substitution of wind mills and solar panels for coal-fired power plants a huge gain for the environment. And in the eyes of many citizens, a substitution that is entirely free of environmental consequences.

Well, as Mark Twain once said, "It's not what you *don't* know that kills you; it's what you know for sure that ain't true."

For instance, there was an interesting study released this past August by The Nature Conservancy entitled "Energy Sprawl or Energy Efficiency: Climate Policy Impacts on the Natural Habitat for the U.S." In the study, they estimate the land use intensity of energy production by various sources. The measure was square kilometers of impacted area per terawatt-hour of produced energy in that year. Forecasting for the year 2030, they showed that wind power's land use intensity per terawatt-hour produced was 7.4 times that of a coal powered plant, while solar-produced electricity was 3.8 times the intensity of coal. In the case of wind, about 5% of impact was the clearing of land for the turbine; the remainder of the impact was from fragmenting habitats, species avoidance behavior, and bird and bat mortality.

Now my point here is not to argue that coal is superior to wind or solar as a way to generate electricity. In fact, I am a supporter of both wind and solar because I believe that we will need to rely on

all these energy sources in the future. But I do suggest that the idea that wind and solar are "guilt-free" energy is simply wrong.

That's why I think that our current debate on energy and climate often is badly framed.

Too often it is "energy vs. the environment", when what it should be is "energy AND the environment." I doubt that the United States will turn its back on coal, natural gas and oil, particularly if we are to remain competitive in the global economy. Nor do I doubt that we will need to continue to increase our use of nuclear and alternative energy sources.

Consider the story that appeared in the New York Times two weeks ago. The International Energy Agency estimated that, worldwide, consumer electronics represents 15% of household power demand. Cell phones, iPods, play stations, flat screens TVs and all our other gadgets now represent the fastest growing source of power demand in the world. In America, for example, the average American household now has 25 consumer electronic products compared with only 3 in 1980.

The IEA estimates that meeting the growth in power demand from these products would require building the equivalent of 560 coal-fired power plants, or 230 nuclear plants.

Can wind and solar be counted on to meet this kind of demand growth when today they constitute less than 2% of the electricity generated in the U.S.? It seems unlikely. Common sense suggests that we must advance innovative technologies for using all our energy sources to meet our environmental and energy goals. Putting our eggs in one basket, whether green or black, is tragically short-sighted.

Yet current climate change legislation comes dangerously close to establishing a carbon-constraining regulatory system that will expect too much of alternatives and of conservation, and rely too little on traditional energy sources such as coal, natural gas and oil.

Without debating the merits of the scientific foundation on which this legislation is based, let's examine the underlying philosophy of all of the proposals currently in Congress.

All the proposals assume that U.S. carbon dioxide emissions must be substantially reduced by 2050, four decades from now. The shorthand for this is 80 by 50 – meaning an 80% reduction of carbon emissions from 2005 levels by the year 2050. To give you some perspective on just how large a decrease that is, on a per capita basis, you would have to go back to 1875 to find carbon levels that low in the United States. So this would be a significant change.

The target is achieved by requiring a carbon dioxide emitter to hold a permit, or an allowance, for each ton of carbon dioxide emitted in a given year. The limits are achieved because the government controls the total number of allowances available and, in phases, gradually reduces the number it makes available. The government sells some of these allowances, but also distributes some to existing emitters for free. Because the permits may be bought and sold after they are initially distributed, a market will develop that will achieve carbon reductions at the lowest cost. Companies who reduce their carbon emissions more than the number of allowance they hold will be able to sell those "excess" allowances to others who need them to cover their emissions.

This is the so-called "Cap and Trade" system for controlling carbon.

In theory, this system should work. But while it will undoubtedly result in lower carbon emissions, it may not result in the lowest cost. In fact, as now crafted, we think these proposals will impose crushing costs on the economy and on every American family.

One key reason is that the targets and timetables for emission reductions are extremely aggressive. While the overall goal is to reduce carbon emission by 80% in 40 years, there are interim targets as well. And therein lies the problem.

I have already made my case for the fossil fuels remaining a part of our energy mix. We cannot alter the direction of our energy ship very quickly. Fossil fuels must remain part of our energy mix while this huge vessel alters course.

For coal, the way we remain part of the energy mix in a carbon-constrained world is through technology. Coal combustion must be conducted in a way that the carbon dioxide it produces is captured and then reused or permanently stored out of the atmosphere.

Work on such technologies is already underway. As we speak, CONSOL is testing a carbon dioxide capture technology that has captured, thus far, more than 95% of the carbon dioxide produced from coal burned in a pressurized fluidized bed combustion vessel.

We are working with the U.S. Department of Energy and with the Commonwealth of Pennsylvania on carbon dioxide storage techniques. In fact the D.O.E. test, which is attempting to sequester carbon dioxide in an unmineable coal seam, is taking place here in northern West Virginia.

We believe that both the capture and storage technologies will prove to be successfully scalable to commercial size. What is required is time. Based on the work that has been done to date, we believe carbon capture and storage technologies will be available on a commercial scale in 10 to 12 years and deployable on the existing fleet in 15 years.

But if the timetables for carbon reductions are not chosen carefully, we run the risk of requiring emissions reductions sooner than the technology is available to achieve them. In that case, we fear that a significant amount of current coal-fired power production may be taken off line. The loss of the power will have significant negative ramifications for the economy and American competitiveness.

That's why we need to work closely with Senators Byrd and Rockefeller, with Congressman Mollahan, and with Governor Manchin to make sure that any legislation that is ultimately adopted is crafted to keep West Virginia coal and natural gas in our nation's energy mix.

Government funding to develop the required technologies is essential. Equally important will be the harnessing of the intellectual resources of great universities like WVU to lead the development of these critical technologies. From a West Virginia perspective, dealing with the energy and environment issue correctly will require a team effort.

Sound energy policy requires the recognition that fossil fuels such as coal and natural gas must remain part of our energy mix. Sound environmental policy requires the development of technologies to use these fuels as efficiently as possible and as emission-free as possible.

The United States has always been blessed with abundant natural resources. Our development, our rise to prominence in the world, is owed, in part, to the abundance of our energy resources and our ability to harness them efficiently and at low cost. The world's fossil fuel reserves remain enormous – an estimated 32 thousand quads of energy. Nearly 60% of that is in the form of coal. The U.S. has the world's largest reserves of coal – more than 240 billion tons.

But maybe equally important to you and me, West Virginia is blessed with substantial coal reserves, the development of new drilling techniques, and substantial natural gas reserves as well. We sit above a huge pool of energy that will run our factories, move our products, and light our homes.

It is the pool of energy that will keep us healthy, safe and secure. It is the pool of energy on which will float the hopes and aspirations of generations of West Virginians. It is up to us to show the rest of the world how it will be done. To show the world how we can use our energy resources AND protect the environment on which will all depend. Here in West Virginia we have the resources, the talent and the will to succeed at this task. All that is required is to begin.

It has been a great pleasure to be with you today. Thank you.