



# **“How the U.S. Can Ensure Energy Supply for the Future”**

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John Hofmeister was named President of Houston-based Shell Oil Company in March 2005. In this position, he heads the US Country Leadership Team, which includes the leaders of all Shell businesses operating in the United States.

Hofmeister became President after serving as Group Human Resource Director of the Shell Group, based in The Hague, The Netherlands.

A business leader who has observed and participated in the inner workings of general industries for more than 30 years, Hofmeister has held key positions in General Electric, Nortel, and AlliedSignal (now Honeywell International), in addition to Shell.

Hofmeister believes that to ensure US energy for the future, the energy industry must address the delicate balance between energy production and consumption with increased supply. He calls for a full array of energy sources: conventional oil and gas—including access to resources presently off limits in offshore waters and on federal lands—as well as unconventional oil and gas from oil shale and oil sands. In addition, he encourages development of clean fossil fuels and alternative and renewable energy sources, while conducting business in socially and environmentally responsible ways.

Hofmeister earned bachelor's and master's degrees in political science from Kansas State University. During his career, he has lived and worked in North America, Europe, and Asia. He is a member of the Department of Energy's new Hydrogen and Fuel Cell Technical Advisory Committee and a member of the Board of Directors, the Executive Committee, and the Policy Committee of the American Petroleum Institute. In addition, he serves on the boards of the Foreign Policy Association, United States Energy Association, National Association of Manufacturers, National Urban League, and he chairs the Resource Development Committee of Jobs for America's Graduates. Hofmeister is a Fellow of the National Academy of Human Resources.

**Shell is undertaking a cross-country tour for the purpose of meeting and talking to a wide variety of people who have a stake in our company and our industry. We are doing this for the simple purpose of sharing information on a topic that's extremely important to every American: Meeting the Energy Challenge.**

**Historically, our industry has not done a good job of explaining the challenges of providing energy: how gas prices are set, how the focus today is on supply and the focus of tomorrow must be the diversity of supply. Given the current climate in the U.S. regarding energy, we realize that there is an urgent need to discuss these issues and answer the tough questions. We believe that the most effective way to educate people about what Shell has planned now and in the future to ensure an ample supply of energy is to meet with them directly. It's about education – but it's also about listening.**

Thank you, ladies and gentlemen, for being here today. It's a pleasure to be here in Charlotte and to discuss this topic of energy security with you. We had the pleasure of meeting 50 or so of your leading citizens last evening at a Town Hall here in the Westin. We stood together for about two hours and listened to what people in this community had to say. And we were also pleased this morning to meet with your Mayor and we talked about energy as well. And we had one of those good-bad discussions about energy. It was a good discussion but about some very bad issues related to energy and that's really how I will begin my remarks.

I'll start with the Friday night after Rita bashed through East Texas and Western Louisiana. While the rest of Louisiana, Mississippi and Alabama were still shut down in terms of oil production and refining from Katrina, along came the second hurricane, Rita, and shut down what else was not shut down on the Gulf Coast—from Houston all the way over to Beaumont; all the way over to Lake Charles, Louisiana. So we now have a completely shut down infrastructure, Gulf of Mexico production platforms as well as all of the refineries from Galveston all the way over to Mobile, Alabama—all basically shut down. So that Friday night after Rita, I called Secretary Bodman. Here in Charlotte, you were having a little trouble with panic buying, you may recall. I called Secretary Bodman to say, "Secretary (and by the way I got him at his daughter's wedding rehearsal dinner, not

exactly the most propitious time to have a discussion about energy) and I said, "Secretary, I need to tell you that we're going to work all weekend to try to get electricity, emergency electricity, into Motiva's Port Arthur refinery—that's a joint venture between Shell and Saudi Refining. We're going to work all weekend because this Motiva refinery has the last 300,000 barrels of finished oil products destined for the Colonial and the Plantation pipelines. And the reason I'm calling you tonight on Friday is that if I call you on Monday to tell you we were unsuccessful in pushing 300,000 barrels into the pipelines, I will call you to please ask the President to declare a day of National Reflection where nobody buys gasoline because it won't be available. Because Colonial and Plantation will be dry by Sunday night." He said, "John, I will pray for you this weekend."

Well, it worked. The Secretary's prayers and the good work of some people working 24 hours a day connected emergency generators to the electrical switches in Port Arthur, Texas and about five o'clock on Sunday afternoon we were pushing barrels into Colonial and Plantation pipelines. But, ladies and gentlemen, we were hours away from having the last available inventory and those pipelines are like garden hoses. A pipeline is like a garden hose - if you don't push something into it, nothing comes out the other end. And you here in Charlotte and your neighbors down the road in Atlanta and your neighbors

in Raleigh, Richmond, Washington, D.C. and Baltimore would have been dry Monday morning. You could imagine if the Charlotte panic buying had continued and add Atlanta to it, add Raleigh, Richmond and Washington to it – the whole nation could have gone into a panic-buying mode. Now, this is the United States of America, the land of plenty. And we were hours, hours from dry pipes.

That then kicked off one of the worst years the American consumer has ever experienced in terms of gasoline purchasing. Because from Rita right up until near the end of this past hurricane season, people have been paying record prices at the pump and not enjoying it for one moment. And so as my staff and I thought about this, and I got the hate mail on my desk and I shared it with members of my leadership team, we said, “What are we going to do about this?” And it’s why we’re here today, ladies and gentlemen. We’re here to talk about the issue of energy security and what we can do about it because now let me move to the “good news story.” I’ve told you the “bad news story.” The “good news story” is energy security is available if we want it.

Now we define at Shell, “energy security” as available, affordable energy not just for this generation but also for the generations to come as far as we can imagine generations into the future. Now that’s a very long time. Energy security, affordable and available for the generations to come is available if we want it. How does that happen?

How it happens is by developing the available known and yet-to-be-discovered conventional oil and gas. Conventional oil and gas, of which the United States has billions and billions of barrels locked up on Outer Continental Shelf and locked up on federal lands, is estimated at some 85 billion barrels of oil and gas—conventional oil and gas—available in the Continental Shelf. Now today in the Gulf of Mexico, we’ll produce a couple million barrels to support the nation’s needs. But if you look at the actual operations in the Outer Continental Shelf of the U.S., ladies and gentlemen, we are operating at less than 15 percent of the Outer Continental Shelf.

Meaning that 85 percent of the Outer Continental Shelf of the United States could be available for more exploration and production to find even more oil and gas than the 85 billion barrels we already know about. But we’re not allowed to. It is off-limits by public policy.

We are pleased that Congress, at the end of the 109<sup>th</sup> session, in the eleventh hour of the last day, passed a Bill giving the oil companies access to eight million new acres in the Eastern Gulf of Mexico (an area called “Lease 181”). That will be a benefit but that’s only a few billion barrels of estimated oil and gas production, which, of course, is not enough to meet the needs of the future. The point being that public policy restricting oil and gas exploration on federal lands and Outer Continental Shelf is precluding the development of billions of barrels of oil and gas, which would be enough for another 30 to 40 years of continuous production. So we can change that public policy by convincing members of Congress and the President to grant more access. But if we were to get that access, would that be enough to deliver energy security into the future? The answer is “no.”

There’s more good news. In the oil shale fields of Colorado, Utah and Wyoming there are estimated untold billions—untold billions of barrels of available unconventional oil and gas, (unconventional in the sense that you can’t drill it and pump it out as a liquid). Instead, what you have to do is one of two technologies: either mine it, which means dig big quarries and crush the rock and heat the rock in big retort systems; or a technology that Shell is investigating and researching is an *in situ* technology where we drill conventional holes into the ground, put feeders in the holes, apply heat to the oil shale and release the molecules, which then turn into liquid and gas which flow as liquid and gas would, and we just pump it out. We’ve been there for 20 years working on this technology. We’ve produced high-quality, nearly-refined oil from the ground, with natural gas as well, but we’re still years away from perfecting the technology to where we can make a financial investment decision. But we believe that there are

significant opportunities in the oil shale of Colorado as well as the oil sands of Alberta, Canada, where today there is by national policy of Canada development of the oil sands in Canada, and Shell Canada (one of our subsidiary companies in Royal Dutch Shell) is producing about 150,000 barrels a day of oil sand, high quality crude.

So, if we have the unconventional oil and gas and we have the conventional oil and gas, you might ask yourself, "Is that enough to meet the long-term energy needs of the nation?" And the answer is still no. There's more. In this country we love natural gas. The natural gas marketplace of this country is huge and it continues to grow. But it has a problem. The problem is the demand is greater than the supply, particularly if you look out over the next 10 years and you see the number of gas turbine electrical power plants that are coming on line and what you discover is that the demand-supply relationship goes into the wrong formula about five years from now, which means we could see a tremendous increase in the cost of natural gas, based upon our projected increases in production to meet that demand. We're not sure how to do it. Particularly if we continue to have restricted access in the conventional gas fields of the Outer Continental Shelf or up in Alaska. And if we don't have the access and the natural gas is still in demand, we do have an option; however.

And that option is called liquefied natural gas. Liquefied natural gas is gas produced in fields a long way from the U.S.—for example, the Northwest Shelf of Australia or Sakhalin Island, Russia, or the Middle East or Nigeria. That gas can be cooled into liquid form and shipped by ship to the United States and reconverted into gas. And, the estimate is we could supply about 20 percent of the nation's need for natural gas by bringing in liquefied natural gas. Now today the country does enjoy some liquefied natural gas and Shell is active in re-gas terminals in Elba Island, Georgia, and also in Cove Point, Maryland, but they're not big enough and therefore we need more. We need to expand those and there are more

terminals needed. But now we run into a problem.

The problem is, who will license the terminals? Which state will accept them? Which city of which state will accept them? And each company that is attempting to build a re-gas terminal is running into the same reality and that is opposition to the siting of a re-gasification terminal for future LNG supplies. Shell is working on one with TransCanada in the Long Island Sound where we so far have gotten permission from the Coast Guard to proceed, permission from FERC to proceed, but we still need the Governor of New York to say yes, he doesn't see any reason why we can't build this terminal. And the forces working against this project are enormous. We're still a little bit away from a decision. We're working very hard to site this terminal. But whether it's the Gulf of Mexico or the East Coast of the U.S. or the West Coast of the U.S., siting regas terminals to bring LNG into this country, again, touches public policy and whether we can get licenses or not.

But suppose we all get our licenses and we bring liquefied natural gas into this country, is that enough to meet our long-term energy security? The answer is no. There is in this country a lot of coal. We are blessed with more coal in this country than the whole rest of the world. And here technology works in our favor. Coal gasification technology has advanced dramatically in the last 20 to 30 years. The Fischer-Tropsche method of turning coal into gas is essentially perfected. And Fischer-Tropsche as a technology has been around for 80 years, so it's not new technology but managing it and managing it in affordable, cost-efficient ways is now with us. And so the good news is that with integrated gas combined cycle technology and the gasification of coal, we could have lots and lots of electricity produced with what people are calling "clean coal." Cynics would say, "That's an oxymoron." But yet, think of this for a moment. I'm a political scientist, right? I'm going to explain the technology of coal gasification, bear with me here.

Imagine taking pulverized coal, which currently feeds conventional power plants, and reducing that pulverized coal, which is like little pea gravel. Reduce that pulverized coal to the consistency of talcum powder. I would say baby powder, but it smells too sweet. Talcum powder – take the talcum powder and introduce that dry talcum powder into a Shell gasifier at 2,500 degrees Fahrenheit at more than 1,000 PSI and what happens to the molecules of that talcum powder-like coal? It gasifies. You could say it explodes. But, it gasifies. The molecule is destroyed into its basic elements, which can then convert into thin gas, which is the same as natural gas. The natural gas spins off into the combined cycle turbine, which makes electricity. The carbon dioxide can be captured and with membrane technology inside or adjacent to the gasifier, that CO<sub>2</sub> can be captured and managed, if the management is sequestration that's one thing. If the management is some productive use of the CO<sub>2</sub>, that's something else. But, it doesn't have to be emitted to the atmosphere. Other emissions can also be captured, such as heavy metals or other sub-elements of the coal molecules. And it can all be managed through the gasification process, which is why it's called, "clean coal." Now, the good news is the technology is here. Shell has projects around the world. We're still working on our first major project to be signed in this country, but we're close. But the United States is about 10 years behind other parts of the world in the development of coal gasification as a power source. And so that represents a huge opportunity for more clean energy as the future unfolds.

So now we have conventional oil and gas; we have unconventional oil and gas; we have liquefied natural gas and we have coal gasification. Four major sources of fuels for the future. Is that enough to meet our security needs of the future? No, not if we look far enough out. What else is there?

Of course, there's biofuels. We heard the President speak to it in two recent State of the Union addresses. Shell happens to be one of the world's largest distributors of ethanol.

And Shell is interested in the development of biofuels because Shell is, after all, a fuels company. Our major fuel today is gasoline, or jet fuels, or other fuels that power our mobility needs. But, any fuel that we can bring to market that customers will use is, of course, something we're interested in. When it comes to ethanol, our investments are all going to second-generation ethanol. Shell's investments are going towards cellulosic ethanol rather than corn based ethanol. Not that we have anything against corn, but we also like to eat. And so there is a trade-off that society must make between corn-based ethanol as a fuel and corn-based ethanol as a food product. And we need to be involved in that in one way or another.

But frankly we're already accused of high gas prices; I'd rather not be accused of high food prices at the same time. Therefore, our investments are going into cellulosic ethanol, such as ethanol made from straw. We're in a partnership with a company called Iogen. We're working on making fuel from straw, a waste product of wheat. In addition, we have a partnership with a company called Choren, which uses the Fischer-Tropsche gasification process to turn woodchips into ethanol, a very doable proposition.

And there is a third investment in a company we haven't named yet, which is developing the enzyme research to make ethanol from other waste products, such as cardboard and paper. So imagine that—imagine ethanol coming from straw, from woodchips and from paper. And we believe it's doable. Now, is it doable in the timeframe that the President proposed? We're not sure. We're not sure the technology is far enough advanced to get to let's say a 35-billion-barrel goal in just 10 years. In fact, we'll probably still be doing research in the next five to seven years, which leaves little time left to mass produce ethanol, if the research is successful. So, we don't know about that timetable, but we do believe cellulosic ethanol is a very viable alternative energy fuel for the future.

Is that enough? No, there's more. One good natural asset this country has a lot of, in

addition to coal, is wind. And there's several ways you could take that. We have a lot of wind in this country. Shell is actively involved in wind farms all the way from Maui to Storm Mountain, West Virginia. We're in seven states; we're producing about 350 megawatts a day of wind-driven electricity, which is, of course, CO<sub>2</sub> free. Now, wind is not a perfect form of energy because sometimes the wind doesn't blow and it may not be blowing just when you need it most. So, as a variable alternative energy, we believe wind has a lot of promise; therefore, we are investing heavily in wind and we believe there are still a lot more megawatts to produce from wind, because it is wasted energy if a turbine isn't turning. So we could put turbines around in many different places and there are maps of where the wind blows in this country, which are very effective ways of plotting where to put turbines.

In addition, there's solar energy. Now Shell has been active in solar energy for about 10 years. But recently, as recent as last year, we made a strategic decision to exit the silicone-based photovoltaic cell manufacturing business in preference of a new technology. Now there's nothing wrong with silicone. Silicone-based photovoltaic cells are fine and they do produce electricity from the sun. But Shell is interested in the long-term commerciality and we believe that silicone will always be competing with computer chips and, therefore, the demand for silicone will always be intense.

Instead, our researchers have come up with a different substrate called copper indium diselenide, which, when sprayed on glass, actually has a higher efficiency of production to silicone, so more electricity from the sun with less weight and less cost put into the substrate and we formed a joint venture with a company called St. Gobain and we are now building a manufacturing plant to make photovoltaic panels from copper indium diselenide substrate on glass, which will be some years from market, but we believe a great alternative for solar electricity production, whether at the residential level or at commercial levels.

Are we there yet, folks? Not quite yet. One more major product area, which Shell believes has great promise—particularly for those interested in mobility but also in other power generation—is the hydrogen fuel cell. Hydrogen is available in nature, in where? In water. It's also available from hydrocarbon fuels. But over the longer-term future, Shell sees a day where the electrolysis of water made from clean electricity can be converted into hydrogen, which can be the primary fuel source for the hydrogen fuel cell vehicle. How far away is that technology? Well, today in Washington, D.C., at a Shell Station on Benning Road, about three miles from the Capitol, several General Motors hydrogen fuel cell vans will be refilled with hydrogen at the Shell station through a normal-looking gasoline pump, except it's converted to hydrogen, and they will tool around Washington driving members of Congress and Congressional staff around the city demonstrating that hydrogen fuel cell vehicles are already here. The technology works. The hydrogen is available. It's not ready for prime time yet, however—meaning it's not ready for commercialization, for two main reasons.

One: where would you buy your hydrogen here in Charlotte? We don't have an infrastructure of hydrogen stations around the country yet and that takes time. Lord knows, it took 100 years to have the existing fuel structure that we have today and we enjoy and rely upon but even it as we discussed earlier in these remarks has its shortcomings, such as pipelines, which don't have fuel in them. The second obstacle is the storage of hydrogen in the vehicle. And how does that storage take place? Currently the technology gets us about 100 miles to the tankful of hydrogen. You probably would not, as a consumer, like to stop every 100 miles to refill your fuel tank. Detroit would say—General Motors, our partner, would say—it takes about 300 miles worth of hydrogen to satisfy the consumer that they have a reliable source of energy in their vehicle. And so that's being worked on. In addition, there's the cost of the fuel cell itself, which is a problem that is viewed as one of those normal technological research issues where the more we know about it, the more

we can bring the cost down. And that's being worked on as well. But if we have the hydrogen fuel cell vehicles; if we have solar and wind and biofuels and conventional and unconventional energy and liquefied natural gas and clean coal – are we there yet?

Only if three more things happen, ladies and gentlemen. And this gets to each and every one of us in this room as consumers. First and foremost, what is the future of energy efficiency in this country? What do we do with technology? What do we do with marketing tools to raise the efficiency levels of the use of energy? We all know that energy as it is used today is predicated on the last 50 years of available, affordable, cheap energy. But we know that the next 50 years, that available, affordable, cheap of the past is going to be very different in the future because we've crossed the tipping point; we've passed peak oil when it comes to easy oil. We haven't reached peak oil in terms of total oil and gas but in terms of easy, conventional oil and gas where you poke a hole in the ground as in the *Beverly Hillbillies* and out comes black crude—those days are over. And so the easy oil is used up; therefore, we're dealing with the more expensive conventional, where it takes more investment, more time to develop it. It's not that there isn't plenty of it, but it's more expensive.

And so energy efficiency and what Shell calls for as a “Culture of Conservation” where we actually don't just talk about rules and regulations but we talk about hearts and minds. Culture is about hearts and minds and the hearts and minds of people go in the direction of conserving. Conserving primarily by designing differently—from our light bulbs to our furnaces to our factories to our automobiles to our buses to our airplanes. How do we get more fuel efficiency from all the above? And we believe there are technical innovations that can make that happen.

Second: educating ourselves and especially our children—as fuel becomes more dear, as energy becomes more challenging to us in the future, educating our young people on what energy means. We did a survey of several

school systems. We can't find a curriculum except in Oklahoma for the teaching of energy. That's not to say there aren't some out there; we haven't found them yet. But what do schools teach about energy? Where does it come from? How is it used? What are the social implications of energy? How is it saved? These are lessons that can be taught to children just as we teach our children math and science and history and other courses. And so we call for the education of our young people but also the education of all consumers, which is partly why we're here.

And, finally, what about our environment? The air that we breathe? And the protection of our earth's assets? Releasing CO<sub>2</sub> into the atmosphere, Shell believes, contributes to the accumulation of greenhouse gases. And Shell calls for a regulatory framework promoted by government, decided by government, which creates markets in which energy can be better and more wisely managed in terms of the emissions of hydrocarbons, or the emissions from any other heat source that we use for the production of energy. And by having a regulatory framework at a national level and calling upon governments around the world to adhere to a regulatory environment in which markets such as cap-and-trade markets can operate successfully to drive us toward cleaner, ever-cleaner use of energy, we believe that's in the country's interest and also in the world's interest, and so we call upon government leaders to do just that. We were part of the Kyoto discussions more than 10 years ago. We believe that those Kyoto Accords made sense then and we believe that we need that kind of a framework of one type or another, that government should adopt to take us into the future.

So with all the above—with conventional oil and gas, unconventional oil and gas, coal gasification, liquefied natural gas, wind, solar, hydrogen, biofuels, energy efficiency, education and environmental protection—that, ladies and gentlemen, is the formula that Shell believes will work to deliver energy security to our generation and to every generation we can imagine into the future. Thank you very much.

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