

Oil Lessons *from*

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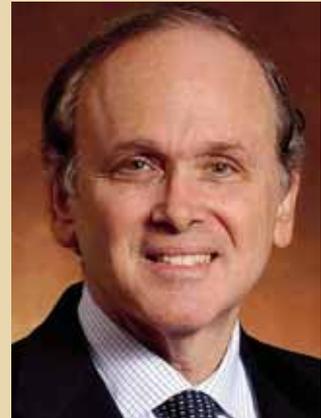
Energy expert Dan Yergin sat down with two of the main energy policymakers from that decade—former Senator Bennett Johnston (D-LA), and John Deutch, former undersecretary of the U.S. Department of Energy. The topic: Have we learned anything from the 1970s experience?



Senator Bennett Johnston (D-LA). A Member of the U.S. Senate from 1972–1997, this longtime chairman of the Senate Committee on Energy and Natural Resources chaired the conference committee on the Energy Security Act of 1980.



John Deutch served as Undersecretary of the U.S. Department of Energy from 1979 to 1980, and later as U.S. Deputy Secretary of Defense and Director of the Central Intelligence Agency. He is currently an Institute Professor at the Massachusetts Institute of Technology.

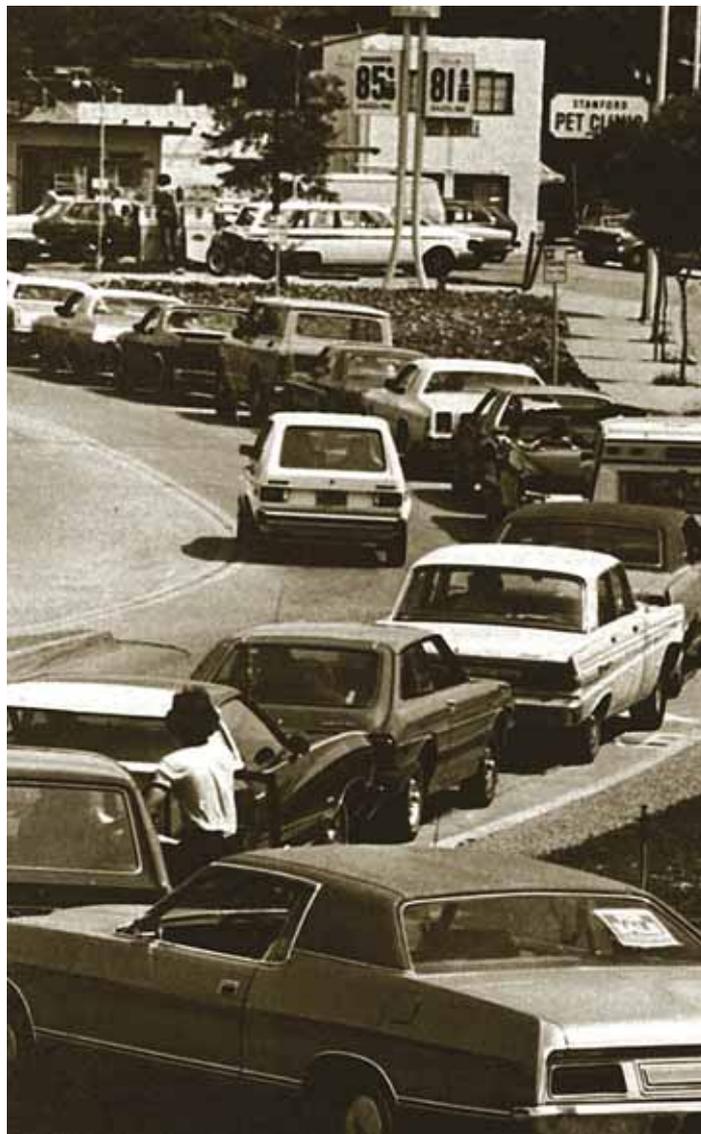


Dan Yergin is chairman of IHS Cambridge Energy Research Associates and winner of the Pulitzer Prize for his book, *The Prize: The Epic Quest for Oil, Money and Power*.

the 1970s

Yergin: This dialogue really has two purposes: First, to crystallize the advice and thinking that you would both offer on current approaches to energy policy, and second, to draw upon your perspectives. You've both been in this field for a long time and can provide a framework for thought and discussion.

Deutch: One of the principal observations I'd make is how the process today for enacting energy legislation compares to that at the beginning of the Carter Administration, which of course Bennett was heavily involved with as a member of the Senate Energy and Natural Resources Committee. While hindsight makes apparent many imperfections, the 1970s saw the passage of quite substantial legislation—especially the National Energy Act of 1978—that made significant changes. To my mind, the reason that piece of legislation was successful was because the Carter Administration put forward a framework within which Congress had to work. Congress made many changes, of course, but having draft legislation that had been thought through by the Administration and put forward as their proposal was, I think, responsible for the quality of that effort. It also helped that House Speaker Tip O'Neill formed a special *ad hoc* committee, the Select Committee on Energy, chaired by Rep. Lud Ashley (D-OH), to shepherd the legislation.



Yergin: Do you feel as if we're picking up where we left off thirty years ago? Are we going down a similar road?

Johnston: The situation now is totally different from thirty years ago. At that time we really had a natural gas crisis. Low prices for natural gas, as set by the Federal Power Commission, meant no gas was being committed to the interstate market, while there was plenty in the intrastate market. We simply had to deregulate.

Now, I would disagree with John in one sense. The Carter Administration had a framework, but it didn't start off with a deregulation bill. That really evolved from the committee. The Senate had earlier passed the Pearson-Bentsen bill to end natural gas price controls, while the House had a continued regulation bill, and over a period of something like fourteen months we had to meld the two. We came up with what amounted to the most successful bill I think I've seen in Congress—the Natural Gas Policy Act of 1978, part of the National Energy Act that John mentioned. It just worked beautifully at the end of the process. The price of natural gas went down, and the supply went up.

Yergin: The most successful bill not just in terms of the legislation itself, but in terms of the result?

Deutch: Exactly.

Yergin: People look back on that period as the oil crisis era, but you both see the big political issue not as oil but as natural gas.

Deutch: The point is that there was tremendous interaction between the Administration and both houses of Congress. It produced the Public Utility Regulatory Policies Act, the Energy Tax Act, the National Energy Conservation Policy Act, the Power Plant and Industrial Fuel Use Act, and the Natural Gas Policy Act—in sum, the 1978 National Energy Act.

With hindsight these pieces of legislation are not perfect, but the process led to successful legislation because the Administration was involved with an articulated point of view.

Yergin: And today we don't see that?

Deutch: Today the attitude of the Obama Administration is to tell Congress what it wants, and let Congress work out a bill. That doesn't seem to me like a way to get good legislation. Bennett may differ.

Johnston: A key person in the early Carter Administration was Jim Schlesinger, first the Assistant to Carter for energy policy and in 1977 the first U.S. Secretary of Energy. He was very bright and very good, and he spoke for the Administration. Schlesinger was directing the Administration's work on energy legislation, not Carter, and Jim worked with us on a daily basis.

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Yergin: Schlesinger had that wonderful quote: "I understand now what hell is. Hell is endless and eternal sessions of the natural gas conference."

For those who don't know, unlike today, a good part of energy policy in the late 1970s was largely about getting us out of price control systems.

Johnston: But in 1973, when the price of crude went up overnight and then it quadrupled, there was a sense that we could not let the oil companies capture all that windfall profit. From a political standpoint regulation in the energy market was necessary, and then we spent the next few years trying to get out of it.

Yergin: At the end of the Carter Administration, we had the vast synthetic fuels program introduced in the Energy Security Act of 1980, which was an effort to create a new energy economy. What are your thoughts on this today?

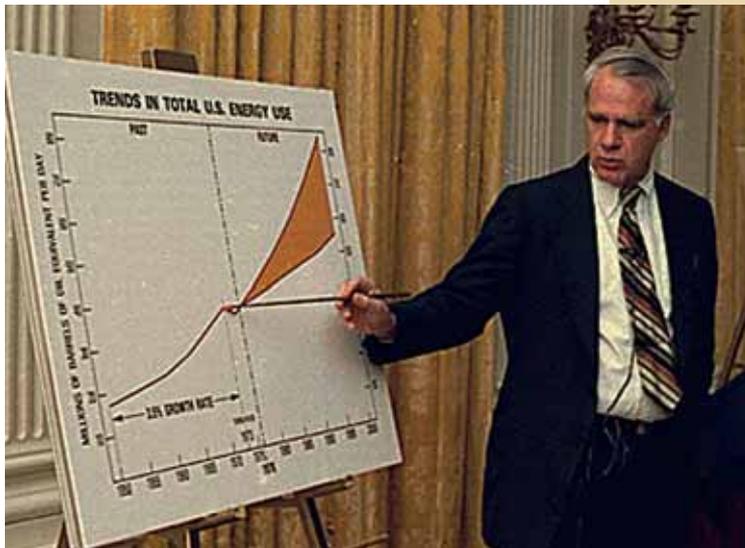
Deutch: My view is probably more favorable than Bennett's because I was one of the guys responsible for trying to shepherd that legislation through Congress for the Carter Administration.

Two aspects of the Synthetic Fuels Corporation deserve note today. The first is the confusion about whether the objective of the Synthetic Fuels Corporation was a production goal, such as producing two million barrels of oil equivalent per day by 1990, or whether it was to demonstrate the availability of synthetic fuels technology, especially shale oil and synthetic gas and liquids from coal. What doomed the Synthetic Fuels Corporation conceptually was that it went for quantitative targets as opposed to technology demonstration. In the early 1980s when the price of oil collapsed from roughly \$40 per barrel down to \$10–\$12 per barrel, the purpose of the corporation and its quantitative goals disappeared. Second, the Synthetic Fuels Corporation was financed by revenue from the windfall profits tax, and that made a difference at the time.

Johnston: I was chairman of the conference committee that shepherded the Energy Security Act through the Senate, so I didn't have a bad opinion of the Synthetic Fuels Corporation at the time. John, you correctly analyzed it. Mainly, shortly after the Synthetic Fuels Corporation was created, President Reagan was elected, and the price of crude fell through the floor. President Reagan's Administration had total contempt for the Synthetic Fuels Corporation, so it didn't stand a chance. They snuffed it out.

Yergin: But the real purpose of the Synthetic Fuels Corporation was to provide some alternatives to dependence

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James Schlesinger, Assistant to President Carter for energy policy, gives a briefing, April 19, 1977.

on oil at the time of the revolution in Iran and the second oil crisis.

Deutch: The idea was to have a backstop technology to undercut how high oil prices could go. There was general support for this on both sides of the aisle. Senator Pete Domenici (R-NM), a key member of the Energy and Natural Resources Committee, supported it.

Yergin: Today, of course, the focus would be on how carbon-intensive these alternative energy technologies are.

Deutch: Well, as Bennett will say, if you don't use coal, you're nowhere. The only way to get around the carbon intensity issue with liquids from coal is with capture and sequestration.

Johnston: Precisely.

Yergin: Bennett, I understand you will be participating soon in a conference in Beijing on cooperation with China on clean energy. From what we know today, can capture and sequestration be done on the scale that would be required to deal with great numbers of energy producing facilities?

Johnston: That's what we need to demonstrate. Those who say carbon capture and sequestration on a large scale can't be done and therefore don't even try to demonstrate it are just crazy. We're seeing dozens of demonstration

projects either planned or operating around the world. Right now the amount of carbon sequestered is only a small percentage of what is needed, but I have total confidence that capture and sequestration can be done. The question is cost, and how much additional energy is necessary to compress the carbon.

Yergin: So what is the role of coal today?

Johnston: In the United States today, 49 percent of our electricity is generated by coal. In China the percentage of electricity generated by coal is over 70 percent and growing, and for India, nearly 70 percent. My message is that if you can't figure out how to control carbon from coal, then you can't control carbon. Renewables have their place, but people who believe the whole grid can run on photovoltaic and wind are dreaming.

Deutch: Bennett's right. Imagining a carbon-free world without using coal seems a fantasy. The great virtue of

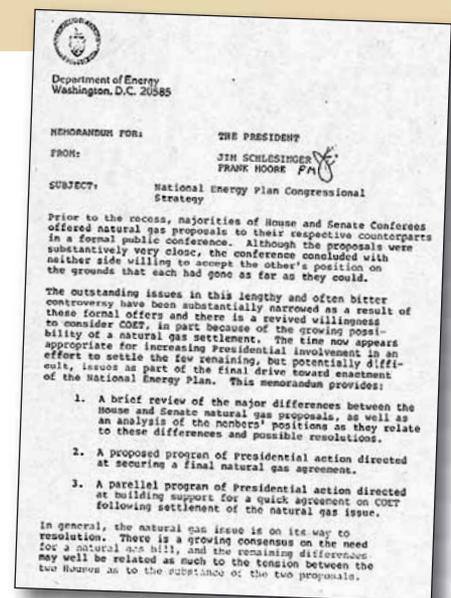
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**"I understand now what hell is.
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—James Schlesinger, 1978

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coal is that it costs basically one dollar per million Btus, which is very much less than even the plentiful natural gas around in the world. I agree with Bennett that carbon capture and sequestration is a must for the future. Unfortunately, the structure of the key climate bill in Congress right now, the Waxman-Markey bill (H.R. 2454), almost squeezes carbon capture and sequestration out for the next few decades.

Yergin: Why is that?

Deutch: Because Waxman-Markey grandfathers the few coal plants that are currently in the licensing process, saying they don't need to have carbon capture and sequestration. It says that carbon capture and sequestration would only be required when it's been demonstrated. That's reasonable enough, but the U.S. demonstration program is woefully behind. Waxman-Markey is not going to make it easier to develop capture and sequestration, and that may be part of the implicit purpose of some members who favor the bill. Also, because the bill nixes the renewable portfolio standard along with the cap-and-trade system, the price for carbon allowances is likely to be too low to justify capture and sequestration for a new plant.

Bennett, doesn't Waxman-Markey make carbon capture and sequestration pretty tough for coal utilities?

Johnston: Well, retrofitting plants is virtually impossible. There is a provision in Waxman-Markey for carbon capture and sequestration on coal to gas, and the Senate is working on a clean energy corporation which would do coal to gas.

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Coal to gas is probably the best hope for carbon capture and sequestration, because carbon captured in the process is then available after sequestering. It would be doubly hard and doubly expensive to try to capture carbon from existing plants, as John's MIT study on carbon retrofit shows ["Retrofitting of Coal-Fired Power Plants for CO₂ Emissions Reductions," March 23, 2009].

Yergin: Back in the 1970s, shale oil was the next big thing. Interest seems to be reviving. What's your outlook for shale?

Deutch: Liquids from shale are probably far in the future because, again, there's the issue of carbon capture. Technically, getting liquids from shale is still a little harder than turning coal to synthetic gas, so I don't see shale oil coming into the market soon.

Yergin: I recently found myself quoted in the *New York Times* saying gas from shale "is the biggest energy innovation of the decade." Would you both see it that way?

Deutch: Certainly. I wouldn't call it an innovation—I would call it a pleasant surprise. It's the biggest news in a long time. There weren't any great technical barriers to figuring this out. Shale gas is present in the earth. The United States goes from being a country concerned about its reserves of natural gas to a country which is fortunate enough to have plentiful supply.

Yergin: I was at the World Gas Conference recently in Buenos Aires. The agenda for the conference was put together two or three years ago, and shale gas hardly figured. But it sort of took over the whole discussion. It seems to have taken almost the whole industry by surprise.

Johnston: Looking back over the last thirty-five years, it is remarkable how much of energy policy has been a series of surprises. The first energy crisis in 1973 was not widely anticipated. Remember the gas bubble, and now shale? I wrote a paper on liquefied natural gas seven or eight years ago, and reviewed all the studies then available, and there was no discussion of shale gas. Even the definitive National Petroleum Council study contained not a word about gas from shale. And the major companies aren't the innovators here. It's the intermediate-sized companies who did it. One of the big lessons in energy is that there will be surprises that cannot be anticipated by the Congress or the people.

Yergin: At the World Gas Conference, I asked some of the major players when they really become aware of shale gas as a potential game changer, and they said around 2007. So what is the next potential surprise?

Johnston: So much is a question of cost. For example, they knew the shale gas was there. The question was figuring out how to produce it at reasonable cost. One surprise will be how expensive photovoltaic is. A president of a company

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who's doing a lot of photovoltaic now says it's \$0.30 per kilowatt hour. Compare that to existing coal plants producing electricity for \$0.025–0.030 per hour.

Yergin: John, you're there in the hotbed of innovation at MIT. What's your view on photovoltaics?

Deutch: I follow photovoltaics quite closely. The MIT Energy Initiative just launched a study to assess solar technology. On the basis of the cost of electricity, compared to a coal plant at \$0.05 per kilowatt hour, it will be very hard to get photovoltaic in a grid-connecting mode much below \$0.15. If a carbon charge were added to that coal, that might lift coal's cost to \$0.08–0.09, but photovoltaics will still be more expensive on the cost of electricity. On the other hand, consider these power generation technologies working together on a grid including transmission, and there will be an important role for photovoltaic energy, but it's not going to do the whole job. We'll need coal and, incidentally, we'll need nuclear.

Yergin: I know you both feel that strongly.

Deutch: A very happy surprise would be to see three or four nuclear plants built in the United States where the cost of those plants was as low as some believe it could be. If that happens, then there will be a resurgence in nuclear.

Johnston: Absolutely. You've got to demonstrate how these technologies—nuclear and carbon capture and photovoltaic and more—will work to really determine the cost. It's all about cost.

Yergin: We often hear the phrase, "if only." If only the support for renewables from the Carter Administration and Congress that was emerging in the late 1970s had the been continued, we would have a large renewables industry today. Was that a lost opportunity?

Johnston: First, it wasn't lost. Do you remember PURPA, the Public Utility Regulatory Policies Act, part of the National Energy Act of 1978? PURPA required the purchase of renewable energy, and caused billions of dollars to be invested in renewables. Billions. PURPA really helped develop the wind industry. So I don't think it was an opportunity lost. Innovation and lower costs just take a long time.

Deutch: In terms of orderly research and development, programs that go on again and off again will never produce successful or efficient innovation. Turning off all solar research development demonstration for ten years then turning it back doesn't encourage innovation. On the other hand, throughout the 1980s and 1990s, the electricity-generating sector always had the ability to turn to a coal plant or to a natural gas plant and generate electricity without experiencing intermittent funding. The only thing that will really help in the long run is a regulatory policy framework where the prices of externalities such as carbon are credibly fixed.

There's a warning here for the Obama Administration, which is doing a lot to support solar and other alternative energy today. While the stimulus package offers good prospects, fiscal constraints may hit twelve or eighteen months from now and again lead to a sharp reduction in R&D spending.

Yergin: John, what would be your advice as to how energy R&D programs should be run? It's been a long time since we've seen so much emphasis on energy R&D. What should be done to make it effective, or is the Obama Administration doing it just about right?

Deutch: I don't think they're doing it just about right. One of the important things we need to do is to demonstrate practical sequestration for carbon in the context of coal. We need to see today's generation of nuclear power plants built. There is room for demonstrating better the use of both solar power and photovoltaics on the grid. The demonstration side of the equation is being less well done than the discovery side. New ideas don't count until you've shown that they can be deployed in an economical way.

Yergin: On the discovery side, a couple of years ago the dominant idea seemed to be that Silicon Valley venture capitalists would fund the discovery side and take it to market. Now expectations have shifted back to government.

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Are young scientists making careers in energy R&D? What's happening on the discovery side?

Deutch: I just spent a week at Stanford and found the same atmosphere I find at MIT, which is a tremendous enthusiasm for energy as a profession. These young students are not looking for a particular government program, but see energy innovation as being a tremendously important part of the national welfare going forward. So whether the money comes from venture capitalists and small companies or from new government research activity, young people are going into energy. I welcome this activity on the discovery side, but I don't think it's the real heart of the problem.

Yergin: How would you go about organizing the demonstration side?

Deutch: I have a sympathy for a kind of an energy technology corporation that could be given real responsibility for making some of these major demonstration activities work, whether it's a few new nuclear plants, or synthetic coal with carbon capture and sequestration, or maybe some work on the grid. But I really believe we need a new method of doing demonstration projects. Bennett, what is your view?

Johnston: I agree completely. But first let me talk about innovation. We need to continue funding innovation, but the public mind has it all wrong. The public thinks that just putting money into energy research will produce some eureka discovery that will solve the whole problem. R&D needs to continue, but the real problem, as John says, is demonstration. Senator Jeff Bingaman (D-NM) is working on legislation to provide sufficient money to that end.

Yergin: Is this the Clean Energy Bank?

Johnston: Yes. We're involved now with three coal-to-gas plants that want to sequester and the process of loan guarantees and grants is painfully slow. We ought to be demonstrating at least three or four carbon sequestration plants

with different geologic mediums, and that takes big dollars and consistent effort. The same with nuclear plants. The loan guarantee program was part of the Energy Policy Act of 2005, but we don't yet have the first one out the door.

Yergin: The time horizon between discovery and implementation for innovators and entrepreneurs is a whole lot shorter than the time horizon for very large organizations such as companies or governments.

Johnston: I was chairman and ranking member on the Energy and Water Subcommittee of the Senate Appropriations Committee for twenty years and I have two rules for energy technology that are absolutely immutable. The first is that it's going to cost more. And the second is it's going to take longer to deploy than anyone ever imagined.

Yergin: Bennett, it's interesting to hear you say that, because there is this view of technological change as sometimes happening pretty quickly.

Deutch: People attribute to technology such attributes as rapidity, inexpensiveness, more jobs, and everything good, but the fact is that energy technology development is a lot of hard work, and the size of the energy enterprise is such that it's not going to happen quickly or cheaply.

Yergin: Two things with the hottest buzz right now in the collective sense are the electric car and its battery, and the smart grid. What is your perspective on these?

Johnston: I'm chairing the MIT advisory committee on the grid, and we really haven't started yet. But the smart grid will be very important. If you're going to bring wind energy down from the high plains you've got to build a huge amount of transmission lines, and the real question is can that be done at a reasonable cost? Will jurisdictions grant you eminent domain? Those are the kinds of questions that make renewable energy possible, but so far Congress hasn't shown the inclination to address the issue. The smart grid

will be very important. For example, if we can figure out how to turn off everybody's air conditioners in a crisis situation, then we don't have to have the extra 20 percent reserve capacity for emergency situations.

Deutch: With electric cars, the first issue that you've got to solve is where the electricity is coming from. A position in favor of electric vehicles or greater use of electricity in transportation also means increasing generation from nuclear energy and developing global carbon capture and sequestration.

The second issue has to do with batteries. People have been calling for advances in batteries ever since I was director of energy research at the U.S. Department of Energy in the mid-1970s, but we've seen essentially none. Today there's a lot of discussion about new approaches to batteries, but the fact is, at the core of the issue is a manufacturing operation, not a new idea that revolutionizes everything. We need ideas about how to manufacture our energy storage at attractive costs, and thus all battery ideas really turn into a manufacturing question.

The third issue concerns the grid. You have to simultaneously analyze several features. For example, what is the character of the generating technologies that comprise the grid? We're about to put a large percentage of intermittent sources on the grid. Also, we need to establish rules for transmission, and as Bennett pointed out, the United States finds it extremely difficult to site long-range high-voltage interstate transmission lines. And finally, how will the grid's elements interact with its pricing strategy? Will there be time-of-day pricing? Will you allow distributive generation to be fed back into the grid at some price?

All of these have to be examined together. It's a vastly complicated subject.

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Yergin: When we look at the legislation that's going through Congress, the long-range objectives are primed to significantly transform the energy economy that we know today.

Johnston: To me, trying to think about the year 2050 is just really sort of avoiding the problem because nobody has the slightest idea what will happen in 2050. To me, the goal of 80 percent carbon-free by 2050 is absurd. Actually, 17 percent by 2020 is pretty absurd, too.

Yergin: So if you were in the Senate today, Bennett, what would you be doing?

Johnston: I would demonstrate technologies. I would put emphasis on the grid, on carbon capture and sequestration, and nuclear energy. These are the three things that most need to be done. You can mandate an electricity company to use renewables, but without a grid to bring it in, the company can't do it. You can mandate the company to sequester carbon, but if there's no technology out there to choose from, and no company already doing it, then the mandate doesn't mean anything. We've got to demonstrate technologies on a commercial basis.

Getting back to the electric car, that also is a question of cost. It's a question of how to recharge and how you build that big system.

Yergin: There is a lot of excitement about electric cars, though.

Johnston: They are what Congress has chosen as their energy innovation *du jour*, but really Congress can't make those choices very well. I would put money into demonstrations of the big things, then let the market choose whether electric cars or hybrids or whatever are the way to go.

Yergin: Why not natural gas vehicles?

Johnston: Natural gas vehicles are a possibility.

Yergin: So we're telling our enfeebled auto industry that we want electric cars, and we want these cars to be a lot more efficient. We also want natural gas vehicles. But wait, we may need a lot of this gas for new capacity in electric generation.

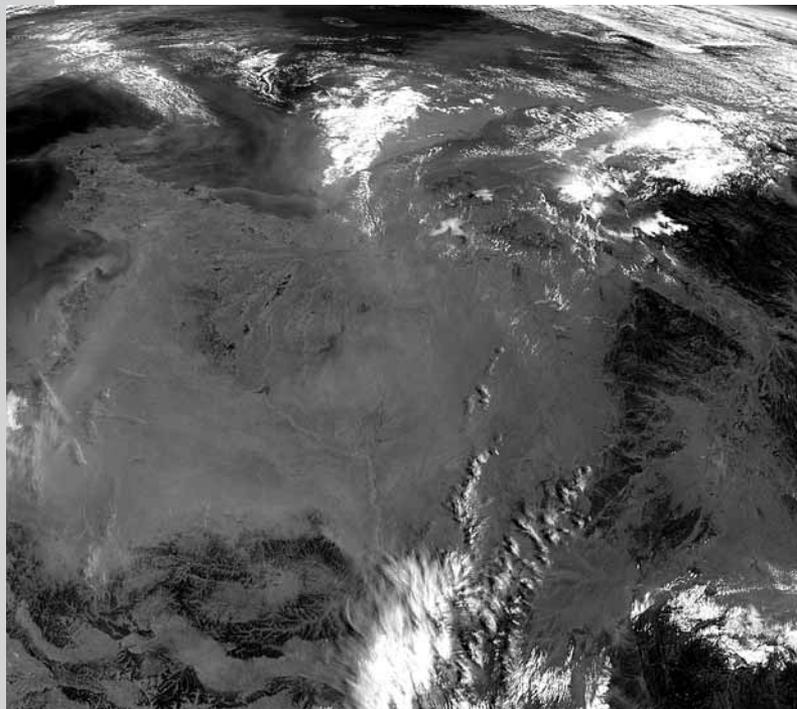
Deutch: Well, you can have it both ways then. You can have flex generation cars fueled by natural gas.

Yergin: In other words, these cars would be fueled by natural gas through electricity generation?

Dense haze covers eastern China, looking eastward across the Yellow Sea towards Korea.

“**T**he Chinese get it when it comes to air pollution. It’s just terrible there, and controlling air pollution relates to carbon control. But the stability of the regime depends upon providing lots of jobs. ... The Chinese have already proposed a target of 15 percent or energy from renewables and nuclear. They’re going to plant a lot of forests and they’re going to promote efficiency. But in terms of controlling carbon, they can’t, even if they want to. Even if they think global warming will eventually inundate the city of Guangzhou, that won’t happen for a long time and these two hundred million people are looking for jobs right now.”

—Senator Bennett Johnston



NASA

Deutch: My time horizon goes out ten years for several reasons. I suspect that we’ll be seeing more natural gas vehicles than electric vehicles. Why shouldn’t all your buses and fleet cars and mid-range trucks be fueled by natural gas?

Johnston: We tried to promote alternative fuels for fleet vehicles in the Energy Policy Act of 1992. That’s the way to start with the natural gas vehicles.

Yergin: We did a seminar recently in Washington on what the effect of unconventional gas was going to be for the national energy dialogue. One thing we find is that the industrial consumers and utilities who have been through so many of these cycles are much more cautious about adopting natural gas than the producing community.

Johnston: Actually, there was an MIT study that says there will be vast supplies of natural gas at \$4 or less.

Deutch: Bennett, that worries me. Look at both the demand and supply sides of it. If you tell the producers that gas prices will stay in the mid-\$3 range, they’ll have problems producing enough. A lot of people say the price of gas is going to stay low, but as for production costs—I wouldn’t be surprised to see them go back up some.

Yergin: How about the energy legislation going through the Congress now, what’s your sense about the direction it’s going?

Johnston: My guess is that cap-and-trade will not pass this year. There’s almost no chance. Healthcare is taking all the time, and the President doesn’t want to risk a bad vote before he goes to Copenhagen. And I don’t think the votes are there right now—not sixty votes for sure, and maybe not fifty votes. Congress will return around January 20, and between then and April, this being an election year, there’s a window in which to try cap-and-trade, but I don’t think it will happen.

Many senators in particular are being told it will increase the cost of energy. They will have already walked the plank for health care and they do not want to increase the cost of electricity, natural gas, or gasoline, which cap-and-trade would likely do. I think there’s a very good chance that we’ll have an energy bill, hopefully with demonstrations, renewable energy standards, an energy bank and so forth.

Deutch: Bennett, my view is when Congress gets presented with these complicated and politically difficult choices, what they do is pass a bad bill. They will pass a bad bill with a little bit of cap-and-trade, a little bit of renewable energy standards, a little bit of mandated efficiency improvements. But these may be in some sense contradictory steps—for exam-

ple, a renewable electricity portfolio standard which leaves out nuclear would compete with the carbon charge and be basically very bad for capture and sequestration. My worry is that they will pass a bill that gives the impression of being important, but in fact is contradictory and weak and does not resolve these problems so that industry and the private sector know where to make their investments this year. I'm much more pessimistic than you are.

Yergin: So Bennett, as a master legislative strategist, how do you respond?

Johnston: I think it is possible to pass a good bill that doesn't include cap-and-trade. You can't require companies to plan long-term for coal plants or carbon capture and sequestration without first demonstrating what the cost is and showing them what can be done. Then they can go to the markets and raise the capital to do it.

Yergin: Bennett, one of your successors was at our roundtable on the impact of unconventional natural gas last week and I was struck when this Senator said that with health care redoing 17 percent of GDP, it's already very unsettling since the ultimate impact is unknown. On top of that, the Senator added, reorganizing the energy sector would be pretty unsettling, too.

Johnston: Exactly. Particularly when they hear it may raise the cost of energy without dealing with coal and not doing anything about China or India. It makes American industry non-competitive.

Yergin: Let's turn to the international dimension. First, we have the upcoming round of international climate talks this December in Copenhagen. What happens with the Chinese, and with the Europeans, if we haven't passed a cap-and-trade bill, or other specific climate legislation?

Deutch: The Chinese will be relieved. They are not prepared to make any commitments themselves, and even if the United

States had a strong cap-and-trade bill, they're not going to make commitments. I think Copenhagen may be less a political problem of recriminations between north and south than it will be a sigh of relief that the problem has been put off.

Yergin: I hear two different versions of Chinese thinking. Some say the Chinese have become completely and deeply alarmed about climate change and what it will do to China, while others say the real issue has more to do with trade.

Johnston: The Chinese get it when it comes to air pollution. It's just terrible there, and controlling air pollution relates to carbon control. But the stability of the regime depends upon providing lots of jobs. I heard the China's President Hu Jintao speak recently, and he said China has two hundred million under-employed people. That means two hundred million peasants coming into the cities looking for jobs. So while I think China would like to control carbon, they simply can't do it and still have a stable regime. The Chinese have already proposed a target of 15 percent of energy from renewables and nuclear. They're going to plant a lot of forests and they're going to promote efficiency. But in terms of controlling carbon, they can't, even if they want to. Even if they think global warming will eventually inundate the city of Guangzhou, that won't happen for a long time and these two hundred million people are looking for jobs right now.

Yergin: What happens with our relations with the Europeans for whom this is such a primary issue? We just say, "Don't be mad at us"?

Deutch: That's right. So what? The Europeans are able for many reasons to crow a little about their carbon reduction efforts, but the problem is what to do with the large emerging economies like China, India, Brazil, Indonesia, and Mexico. The Europeans have no proposal except an import tax on that front.

Yergin: How do you react to the proposals for a border tax on imports from countries that avoid climate standards?

Deutch: I can't tell you how silly I think that is.

Johnston: I agree.

Deutch: The fact is we don't have an answer yet about how to put these emerging economies on a path to carbon emissions reductions.

Yergin: If we do go back to the 1970s, the last period of really high energy prices, the trigger for a lot of what happened was of course events in Iran, and thirty years later

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*Even if the United States could
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our closest partners can't, including
Japan, Germany, and France.*

Iran is back on the agenda. What are you both think about the geopolitics of oil, and what surprises and semi-surprises do you worry about?

Johnston: There's a reasonable chance that we can strike a deal with the Iranians on nuclear and have a little more energy peace in the Middle East. That said, the situation is still unknowable and unpredictable, and also tremendously dangerous. If we did a silly thing like bomb Iran then all bets are off in the Middle East. Oil at \$200 per barrel would then be very possible.

Deutch: Iran is a very complicated subject. With Iran, it's not just the issues of nuclear and oil. It's also their sponsorship of terrorism in the Middle East, and their activities in Iraq. The situation is much more difficult than it was at the time of the Shah's fall.

Yergin: That's a pretty strong statement. The likelihood of total misunderstanding is pretty high, isn't it?

Deutch: I don't think it's that. I don't think that it's a reluctance to interact with the world or have a dialogue, but that there are some difficult issues including the way they talk about Israel, and of course oil and weapons. It's going to be very hard to sort out.

Johnston: And there are a lot of competing bodies within Iran.

Deutch: And competing bodies on our side of the table, too.

Yergin: Do you worry about the potential for another oil crisis with Iran?

Deutch: Bennett put his finger right on it. If there's an air strike on Iran by the Israelis, who knows what the resulting action will lead to? It's not entirely in our hands.

Yergin: "Energy independence" is today a much-vaunted phrase. The other day at Brookings, Vice President Joe Biden said energy independence is not a very apt concept. I was quite surprised. What do you think about the role of this phrase in American politics?

Johnston: It's the same now as it was in 1973, when President Nixon announced Project Independence and said that the United States was going to be energy-independent in 1980. It can't be done to begin with, and why should it be done? We import everything in this worldwide economy.

Deutch: First, even if the United States could achieve energy independence, our closest partners can't, including Japan, Germany, and France. Second, the issue is managing this problem, not trying to eliminate it. It would be terrific to reduce dependence to the point where it doesn't influence the foreign policy of the United States or limit our choices, and also that it doesn't influence the foreign policy of our allies and limit their choices, for example with respect to Iran. But reducing import dependence is probably too difficult to achieve. So it's really a question of intelligently managing these problems as they occur, whether with respect to Russian gas exports to Europe, or nuclear proliferation in Iran, or Chinese oil interests in Angola and the Sudan.

Yergin: A final question. This current recession is not exclusively the result of the credit problems. Commodity prices played a role as well. How do you see these energy questions we've discussed interacting with the global economy?

Johnston: All I can tell you is that the major oil companies say trying to predict the price of crude is a fool's errand. It simply can't be done. That said, I think demand is going to continue to rise, particularly when the world economy recovers, and therefore the price of crude will also rise over time.

Deutch: I agree. The demand for petroleum will continue to increase. Advances in technology may moderate the quantity needed, but looking at it decade by decade, the real price of oil has got to increase. And that will open the door to alternative ways of making liquid fuels, whether from shale or coal or whatever.

Yergin: And so when we're talking about alternatives to conventional energy, alternatives are not a separate issue from what happens. They will be affected by world GDP, but will also be a factor in future economic growth.

Johnston: Whatever we do, remember my two immutable rules: It's going to cost more, and it's going to take longer than anyone thinks it will. ◆