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Discussion

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DISCUSSION FOLLOWING THE REMARKS OF DR. JHIRAD

QUESTION, MR. DAVIS ROBINSON: Thank you very much, David, for that excellent presentation. We will take some questions. I will ask one myself: I am surprised by the lack of reference to nuclear energy, and if we end up in the kind of crisis that we could have, if everything goes the wrong way, is not nuclear the only answer?

ANSWER, DR. JHIRAD: The Shell scenarios also have taken nuclear energy into account, and for the next 20 years, nuclear looks, globally, pretty much static. There are only two countries in the world that are really promoting nuclear energy; Japan has scaled down some, and France's expansion plans are not as ambitious as they used to be, so nuclear power, more or less, stays at a fairly constant value. This could change, however, if it met the public acceptability and safety tests, as well as the market test (in competing with natural gas). All of the scenarios that I have seen keep nuclear power at a constant but not growing share.

QUESTION, MR. KING: David, you are the doctor, the world is your patient, and you stated the problem. Now, let me ask you this: on solving the problem, we need more prescriptions for improvement of the patient's health; technological innovation it is nice to say, but what are the specifics? The patient has got some long-term problems and we want to get your wisdom on how you get together and deal with them.

ANSWER, DR. JHIRAD: The best way to answer that is to say that about a year ago, there were three business models out there for the energy sector, and there was an article in *The Economist* that praised all three of them.¹ They were the Enron model (which is no more), the BP/Shell energy-trading model (in fact, Enron CEO Jeff Skilling was quoted calling this model a "dinosaur"²), and the Exxon Mobile model. The two models left right now are the ExxonMobil and the BP/Shell approach.

I am quite familiar with the ExxonMobil model. They are out of this business of alternative technologies. They spent half a billion dollars on alternatives, and they feel as though they have "been there, done that." They are not doing it anymore, focusing instead on their core business: oil and gas. In fact, their engineers are now working on fuel cells that could be powered with gasoline. There is the BP/Shell approach – creating an internal

¹ See *Energy: The New Convergence*, ECONOMIST, May 29, 1999, at 59, available at 1999 WL 7363251.

² Survey, *The Slumbering Giants Awake: Energy Companies Will Never Be the Same Again*, ECONOMIST, Feb. 10, 2001, available at 2001 WL 7317640 (Quoted as saying that Big Oil was a "sunset industry run by old dinosaurs.").

trading scheme within their own companies – of being very conscious of reducing its own carbon emissions within the company. They are putting much more effort into alternatives, even though those alternatives are not yet widely commercially available and they are not very profitable.

Even though the governments of both of our countries support substantial R&D in all of these areas, I think that since the source of technology in alternative-fueled vehicles, “renewables” and efficiency is going to come from the private sector, as has been the case for the last 25 years. After all, the commercial breakthroughs are going to have to come from the private sector. It would be interesting to see which business models prevail, because there are also a lot of small companies out there that are making batteries and fuel cells and doing work in innovative technologies. I think it will take some inspired public-private partnerships, but these are very tough problems, so I cannot be very glib about them.

It strikes me that there is such a difference of view between ExxonMobil and BP Shell, the former having just \$100 billion more in market capitalization than the latter. It will be interesting to find out how each strategy plays out, and which one will be the corporate and business strategy that determines the future of energy and its production.

COMMENT, MR. DAVIS ROBINSON: Thank you. Who is next?

QUESTION, MR. QUINN: A couple observations: I am reminded that someone said if India, China or the rest of the world lived at the standard of living of the United States and Canada, we would need three planet Earths, so there is simply not enough resources to go around. This raises the issue that, maybe, we should concern ourselves with economic stabilization, not growth.

The other point: these projections that Shell is making are cause for concern; I have often been told about these projections. Sometimes when you have a big corporation, they fight to maintain investor confidence, and since many projects are political, you do not want people to panic. Moreover, there are the so-called “classified” projections that are the technical ones that the public does not get to see. I think that wagering the planet and the lives of billions of people on the guess that there is a technological fix is quite a stretch, when most of the world’s people are not even aware that the bet is being made.

There are others that point out that we should be using fossil-fuel energy to create the renewable economy; creating a solar-cell economy requires an intense fossil-fuel energy – in mining, manufacturing, installation and maintenance – and that we are burning up this nonrenewable energy at a rate so as to not have enough for the transition to make it to a renewable economy to keep ten billion people alive.

Those are just some of the other viewpoints out there, so I will ask you: what are the chances that billions of people may die in this century because

the projections for our energy needs are off, and that we will not be able to bring up enough on-line on time?

ANSWER, DR. JHIRAD: That is a good question. There are roughly about two billion people who have no energy right now, and another two billion people have far less energy than we do, so two-thirds of the world is population has inadequate access to energy. In the business-as-usual scenarios with ten billion people, seven or eight billion people would be insufficiently supplied with energy. Since energy is very closely related to providing clean water, refrigeration of vaccines, and lighting for education, it means that you will not be able to counter the large problem of poverty in the world, and that is a recipe for insecurity.

So that scenario, simply by increasing the number of people living in insecurity and increasing the divide between the haves and the have-nots, is quite possible.

COMMENT, MR. DAVIS ROBINSON: Who is next?

QUESTION, MR. CHARNOVITZ: I thought that was a very good presentation, but a very depressing one, too. I was wondering if you have any thoughts on why energy management is so resistant to coordinated policy. We have very little coordination at the international level, and the efforts that were made under NAFTA came to nothing. Today, we have a *Wall Street Journal* article that states that Connecticut sees no reason to coordinate its policy with Long Island.³ I am wondering: what is the problem? Why cannot we have better policy?

ANSWER, DR. JHIRAD: We have a reasonable energy management policy only when our economies were at risk. For example, after the 1974 oil embargo, the OECD countries formed the International Energy Agency, wherein we cooperated to build oil stockpiles.⁴ Each country has more than 90 days worth of oil imports.⁵ Even Canada, who does not import oil, participates in the IEA as a part of an emergency sharing mechanism. So, everyone coordinated their policies very well when it came to protecting their economies from a catastrophic oil cut-off.

In some large cross-border projects, there is some coordination between the U.S. and Canada because there is a lot of money involved. When it comes to the cross-border trade in natural gas, North American is held up as a model for Western Europe, in Russia, and now for Asia.

³ See, e.g., Andrew Caffrey, *Connecticut Looks to Block Underwater Electrical Line To New York's Long Island*, WALL ST. J., Apr. 17, 2002, at B17, available at 2002 WL-WSJ 3391950.

⁴ RICHARD SCOTT, 1 HISTORY OF THE INTERNATIONAL ENERGY AGENCY: ORIGINS AND STRUCTURE 27 (1994).

⁵ *Id.* at 36.

When it comes to the restructuring of the electric power sector, we should avoid contentious arguments and follow models that have proven to work. Somebody mentioned earlier that the restructuring of electricity sector resulted in a working competitive energy industry in the U.K., in New South Wales, and in Victoria. Instead of speculating about things, we should take international models that work and pursue those; we might actually get more agreement if we used ideas that have been proven to work. You are right; it is exceptionally difficult to get agreement, certainly on domestic energy policy. We do not have what we would call a domestic energy policy, *per se*, at the moment.

COMMENT, MR. ROBBINS: I would like to challenge a statement that I heard from you and from others as well. You said that renewables are not going to become viable because they cost too much, at least not for the near term. I would argue that if you looked at the subsidies that have been received by oil, coal, and the transportation sector, that those subsidies over the past 50 years, I would estimate, have dwarfed the subsidies that have gone to renewables by a factor of 50. Nuclear power, under the Price-Anderson Act,⁶ received large subsidies.

COMMENT, DR. JHIRAD: Right.

QUESTION, MR. ROBBINS: After the \$89 million dollars of insurance you have to buy, who pays the bill? If Lloyd's of London would have to pay out two-and-a-half billion for an accident, what would nuclear power cost?

So my argument is that the whole system has been grossly distorted by subsidies that have to do with various interest groups in the United States and that it does not reflect a real market for renewables.

ANSWER, DR. JHIRAD: I would agree totally with that statement because it is factually true. It is true that fossil and nuclear have been subsidized to an inordinate extent. The only point I was making, was that in order to get renewables to be competitive for electricity generation, we need to be a lot more innovative than we have been to date. I was making was a backhanded argument for being much more positive and much more aggressive about renewables. For example, I talked to BP/Shell and Siemens and asked, what kind of a market do you need to bring the price down to a point where it is competitive for people without power in California, let alone some remote village in Africa? Their answer is, if we had a global market for renewables of approximately four times the current size, which is, well, nothing. The current market is 300 megawatts – merely a third of a power plant. If they had a global market that was four or five times that size, they would build much larger factories. Instead of producing 20 MW a year, they would produce 100 or 200 MW a year, and they could make them profitable

⁶ Price-Anderson Act, Pub. L. No. 85-256, 71 Stat. 576 (1957) (codified at 42 U.S.C. §§ 2039, 2210 (1957)).

at one-third and one-quarter of the cost. It is what I would term a chicken-and-egg problem, wherein the electrical producers feel the market is not large enough and the utilities are not buying renewable energy because the price is too high. What may be needed is for someone to take the lead in a procurement effort in which, say, Southern California Edison will buy 100 MW and PG&E will buy 100, aggregating the market to the point where you would have 1,500 or 2,000 MW. Then, you go to the industry and hold their feet to the fire, saying that since they said that they would produce renewable electricity at competitive costs, they would now have to do it.

So, I am saying, you are right; the subsidies have been very asymmetrical, but what is needed right now is not a business-as-usual approach with renewables. The manufacturer receives orders for several hundred aircraft at a time, as no one would build an aircraft in you built them one by one. You could do the same thing with windmill systems or with fuel cells, but we are not seeing the political will to do anything like that, at least in the United States, but that is what is needed. If you talk to the private sector, they will tell you what is needed, but it is not happening.

QUESTION, DR. HICKEY: Mr. Charnovitz raised the problems of government coordination in achieving a global energy strategy, and I just wanted to raise the same sort of problem on the private side. One reason we do not have an energy policy in the United States is inter-fuel competition. If the oil companies propose something, the coal companies oppose it. The coal companies and the oil companies oppose things that discrete natural gas companies will not; each of those three industries opposes hydro and renewables, and *everybody* opposes nuclear power. So, how do you rely on corporate industry to come up with the sort of agreement on a global strategy of the sort that you outline without massive government regulation?

ANSWER, DR. JHIRAD: Yeah. Well, it is a very tough question. You look at ExxonMobil, with \$300 billion in market capitalization and an 18 percent return on assets last year.⁷ Shell and BP have a market capitalization at around \$200 billion.⁸ The cost of lifting oil to the surface has dropped from \$4 per barrel to 66 cents, so they see 80 years of a petroleum economy. It is very hard for them to take any move to make the world less dependent on oil, given the fact that they are successful and have a going concern. As Lee Raymond says, the dinosaur is alive, well, and very healthy,⁹ so that is a

⁷ See *ExxonMobil*, at <http://www.forbes.com> (market capitalization for ExxonMobil stands at about \$293,604 million) (last visited Aug. 5, 2002).

⁸ BP has a market cap \$191,054 million. See *BP*, at <http://www.forbes.com> (last visited Aug. 5, 2002); Shell, \$192,256 million. See *Royal Dutch/Shell Group*, at <http://www.forbes.com> (last visited Aug. 5, 2002).

⁹ See Charlene Oldham, *Exxon Mobil Touts Strength*, DALLAS MORNING NEWS, Mar. 6, 2002, at D3, available at 2002 WL 18638096 (“Dinosaurs were around for a long, long time, and while they were here, they were really mean.”).

problem, but I do find that the industry has different views. For example, the gas industry in the U.S. will have to see itself as part of the solution to the problem than as part of the problem. While I think that that has yet to happen, I do see stronger alliances between environmental groups and the gas industry forming because some people see gas as the bridge to the 22nd Century. I think the oil industry probably also needs to position itself in a technically sophisticated way, and I think that John Browne¹⁰ seems to be trying to do that; I do not know whether it will be successful. I went to visit the BP solar people right near Washington; they have very impressive factory, but they are not yet profitable but they feel that, eventually, they will be. It is a different corporate strategy.

COMMENT, MR. DAVIS ROBINSON: Thank you.

QUESTION, MR. LOWE: It seems like there we have focused on oil and oil security. I would like to remind people that during World War II, Germany made liquid fuels from coal, and, prior to the end of apartheid, South Africa did the same thing.

I think that one realistic possibility for that long-term future is an increased use of coal, both for power generation and to deal with the increasingly dicey politics of liquid fuels. In that scenario, I suppose environmental security is more threatened than political security. In that world, it seems to me like CO₂ capture and sequestration technologies become absolutely vital. Maybe you can comment on the prospects of those technologies and whether or not this kind of coal-to-liquids scenario has any prospects.

ANSWER, DR. JHIRAD: Yes. The U.S. Department of Energy is studying the concept of coal being used as a feedstock for a sophisticated refinery that creates a whole set of clean products, gas being one of them, and hydrogen being another one. They are thinking more in terms of coal gasification and hydrogen rather than the coal-to-liquids route, only because they feel the economics of coal-to-liquids are not good, and that gas-to-liquids may be a better bet, even though that is way down the pike. In fact, even the Shell people have a dream scenario of using much of the coal in China to run a hydrogen economy, so that China "leapfrogs" from a coal economy to a hydrogen economy without going through any intermediate liquid fuels stage. That is an interesting suggestion, but it is in line with what you were saying.

COMMENT, MR. DAVIS ROBINSON: Is there anybody else? This will be the final question, please.

QUESTION, MS. VERDUN: In my previous job, I was with the Industry Department, and one of the areas for which I was responsible was

¹⁰ That is, the Lord Browne of Madingley, the Group Chief Executive of BP.

biotechnology. One of the things that we were following was the U.S. investment in biomass – you glossed over that very quickly – and, as I recall, there is something around \$400 million invested in biomass.¹¹ Obviously, the distribution system is quite different – you do not have huge plants – you would have much smaller scale production in use, so it is a very different model. I would be very interested your views as to where that fits in both in the U.S. and globally because Asia, with more sunshine and heat than Canada, has a distinct advantage in that area.

ANSWER, DR. JHIRAD: I did not mean to gloss over it, because I think it is important. The focus in North America has been biomass-to-liquid fuels; the focus in the developing world has been the gasification of biomass, because it would be available in rural areas, and they are looking for a source of gas for cooking and for some small power generation. The research in biomass gasification is actually quite advanced, and there are quite a few commercial biomass gas suppliers operating in different developing countries. I think that is way to go.

In terms of liquids – producing ethanol or methanol – my sense is that you will have to deal subsidies in order to go any further. There is some very interesting research going on in terms of enzymatic conversion. At one of our laboratories, the National Renewable Energy Lab, the experts say that they are very bullish on the subject of biomass liquids in the future. That is reflected in the Shell scenario, where you see a steep rise in liquids from biomass for transport after about 2020, reflecting that the technology certainly has a potential sometime in the not-too-distant future.

COMMENT, MR. DAVIS ROBINSON: I do not know about the rest of you, but certainly I found this presentation extremely depressing. I guess we have to hope for some enormous crisis that will bring all of these interest groups together somehow and realize that the politicians have got to wake up and stop the posturing. I guess our society always seems to require some huge crisis, so maybe that is what we need. Thank you for an outstanding presentation.

¹¹ Actually the figure in the U.S. is \$15 billion dollars. See *Biopower: Biomass at a Glance*, at <http://www.eren.doe.gov/biopower/basics/> (last visited Aug. 5, 2002).

