

The Philological Society of Texas

PROCEEDINGS

2007

THE PHILOSOPHICAL SOCIETY OF TEXAS FOR THE COLLECTION AND DIFFUSION OF KNOWLEDGE *was founded December 5, 1837, in the Capitol of the Republic of Texas at Houston by SAM HOUSTON, MIRABEAU B. LAMAR, ASHBEL SMITH, THOMAS J. RUSK, WILLIAM H. WHARTON, JOSEPH ROWE, ANGUS MCNEILL, AUGUSTUS C. ALLEN, GEORGE W. BONNELL, JOSEPH BAKER, PATRICK C. JACK, W. FAIRFAX GRAY, JOHN A. WHARTON, DAVID S. KAUFMAN, JAMES COLLINSWORTH, ANSON JONES, LITTLETON FOWLER, A. C. HORTON, I. W. BURTON, EDWARD T. BRANCH, HENRY SMITH, HUGH MCLEOD, THOMAS JEFFERSON CHAMBERS, R. A. IRION, DAVID G. BURNET, and JOHN BIRDSALL.*

The Society was incorporated as a non-profit, educational institution on January 18, 1936, by George Waverly Briggs, James Quayle Dealey, Herbert Pickens Gambrell, Samuel Wood Geiser, Lucius Mirabeau Lamar III, Umphrey Lee, Charles Shirley Potts, William Alexander Rhea, Ira Kendrick Stephens, and William Embrey Wrather. On December 5, 1936, formal reorganization was completed.

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The Philological Society of Texas

“United States Energy in a Global Context” was the topic of the 170th anniversary meeting of the Philological Society. President Isabel B. Wilson orchestrated a stimulating program, including discussions about the current and future state of this nation’s energy sources, technologies, politics, and economics. The meeting was held in Houston, Texas at the St. Regis Hotel. In attendance were 289 members, spouses, and guests.

The meeting began on Friday December 7, 2007 with a reception and dinner within the galleries of the Museum of Fine Arts, Houston. President Wilson introduced the eight new members and presented them with their certificates of membership. The new members were: David Wellington Chew, El Paso; Jesús F. de la Teja, Austin; Edward P. Djerejian, Houston; Sarita Armstrong Hixon, Houston; David W. Leebron, Houston; Steve H. Murdock, Helotes/Houston; David M. Oshinsky, Austin; and L. Michael White, Austin.

Economists, academics, business people, and other energy experts contributed to the program, held at the James A. Baker III Institute of Public Policy at Rice University on Saturday. After a exciting day of presentations, the program resumed at the St. Regis’ Grand Ballroom for dinner and continued discussion.

The annual business meeting was held on Sunday morning. Secretary Ron Tyler announced Society membership stood at 201 active members (due to an error in categorization of an active member as an associate member, only caught after the vacancy was filled), 71 associate members, and 73 emeritus members, for a grand total of 344 members. Officers elected for the year 2008 are as follows: Boone Powell, president; Michael L. Gillette, first vice-president; J. Mark McLaughlin, second vice-president; J. Chrys Dougherty, III, treasurer; and Ron Tyler, secretary. The names of the Society members who had passed away the previous year were read: Thomas D. Anderson, Houston; Edward N. Brandt Jr., Oklahoma City, Oklahoma; William C. Finch, Nashville, Tennessee; Durwood Fleming, Dallas; Norman Hackerman, Austin; William C. Harvin III, Houston; John L. Hill Jr., Houston; Claudia Taylor Johnson, Austin; Herbert H. Reynolds, Waco; and Elspeth Davies Rostow, Austin.

A lively membership discussion about the weekend’s topic followed the business meeting. President Wilson adjourned the meeting until December 5-7, 2008 in San Antonio, Texas.

INTRODUCTION

ISABEL B. WILSON

Thank you for joining me tonight at the Museum of Fine Arts and for welcoming the new members of the Philosophical Society of Texas.

Tomorrow, we will meet at the James A. Baker Institute for Public Policy at Rice University to examine our meeting topic of "United States Energy in a Global Context." To introduce the topic and provide some context, I have asked Amy Myers Jaffe to speak briefly to us before dinner.

Amy Myers Jaffe is the Wallace S. Wilson Fellow in Energy Studies at the James A. Baker III Institute for Public Policy. She is also associate director of the Rice University energy program. Her research focuses on the subject of oil geopolitics, strategic energy policy, including energy science policy and energy economics. A frequent speaker, she is widely published in academic journals and numerous book volumes. Amy Jaffe served as a member of the reconstruction and economy working group of the Baker/Hamilton Iraq Study Group and as project director for the Baker Institute's Council on Foreign Relations Task Force on Strategic Energy Policy. Prior to joining the Baker Institute, Amy Jaffe was the senior editor and Middle East analyst for *Petroleum Intelligence Weekly*.

To prepare us all for the program tomorrow, she will relate how the city of Houston—and thus the state of Texas—has moved beyond oil and gas energy to become a global energy capital. Amy Myers Jaffe.

HOUSTON AS THE ENERGY CAPITAL:

Moving Beyond Oil

AMY MYERS JAFFE

It is an honor to be here to address such an illustrious group. It is a great challenge I face, speaking to you tonight about the future of the city of Houston, the energy industry and our state. It is a challenge because so many of you have been at the forefront of Houston's great rise as a global energy center. Houston is often referred to as the "energy capital" of the world because for decades, Houston has been at the center of innovation in the oil and natural gas business. We are the home to the amazing engineering advancements in deep water drilling. We are the incubator for advanced technologies such as real time seismic surveying, subsalt and horizontal drilling and deep conversion refining. Houston has been a notable center for R&D in the oil business as well as a center for creative banking and financial products serving the energy industry.

The presence of the energy business permeates our city. Energy companies are omnipresent in our civil culture, as supporters of the arts, sponsors of holiday celebrations, key donors to important civic charities. They support university research, send their employees to clean our beaches and volunteer in our schools, and build among some of the finest towers in our skyline.

Close to 50 percent of the Houston region's economic base—those sectors of the local economy that export goods and services outside the region—is related to energy. In fact, approximately 5,000 energy-related establishments are located within the Houston region, including more than 400 exploration and production firms, more than 30 pipeline operators and hundreds of manufacturers of energy-sector products.

Houston is home to 44 of the nation's 200 largest publicly traded oil and gas exploration and production firms. All the major oil and gas companies have extensive operations in our city.

In fact, in the United States, Houston is home to 30.2 percent of the nation's jobs in crude petroleum and natural gas extraction, 14.9 percent of oil and gas field services jobs, and 42.5 percent of oilfield machinery manufacturing jobs.

Two of the four largest U.S. refineries are located in Houston, and Houston's refining capacity accounts for over one-eighth of the U.S. total.

The benefits of being a center for energy businesses and trade are far reaching. The energy sector employs over 50% of all Houstonians. Houston's position as the world's energy capital brings in significant trade and tourism dollars, attracting international visitors, businesses and even foreign governments. Energy is a key attraction for the 70 international consulates based in Houston. Energy puts Houston on the map; many world leaders visit Houston during U.S. tours. In recent years, head of state visits include those by President Vladimir Putin of Russia, President Olusegun Obasanjo of Nigeria, President Hosni Mubarak of Egypt, and Chancellor Helmut Kohl of Germany.

Moreover, serving as the world's energy capital offers a strong basis for the future of the city. Analysts agree that worldwide demand for energy will grow strongly in the coming decades, particularly as economies expand in the developing world, creating more demand for automobile fuels and electricity. The world will be looking to Houston, the energy capital, for vision and innovation in meeting this rising demand. The question is: Can Houston continue to deliver?

Growing Energy Demand: The Challenges Ahead

The challenge to meet this growing demand for energy, particularly crude oil, will be daunting in the years ahead. Crude oil consumption is expected to rise by more than 20 million barrels per day by 2030; the investment required to provide this volume of petroleum to the market could run up to two trillion dollars or more.

The question of who will be responsible for making these massive investments to fuel the future world economy is a critical one, and the nature of the question is evolving over time. Unlike in past decades, when private, publicly traded oil companies played a major role in the worldwide exploration business, national oil companies will be responsible for a lion's share of the increase in oil output and investment over the next twenty years.

Since the mid-1990s, the traditional role of independent oil companies in oil production has shifted. The oil production of the Big Five (the five largest independent American oil companies) has declined since the mid-1990s; Big Five oil production fell from 10.25 million barrels a day in 1996 to 9.45 million barrels per day by 2005, before rebounding to 9.7 million barrels per day in 2006. In contrast, for the next twenty independent American oil firms oil production has risen in the past decade from 1.55 million barrels in 1996 to about 2.13 million barrels per day in 2005 and 2006.

For the independent oil companies, equity share buy-backs have absorbed a growing portion of cash outlays, rising from only 1% of operating cash flow in 1993 to 37.1% in 2006, while expenditures on exploration account for a decreasing proportion of the total, declining from 13.8% in 1993 to only 5.8% in 2006. It is interesting to note that, despite an almost 50% increase in exploration expenditures from 2005 to 2006,

these expenditures as a percentage of the total expenses only increased from 5.3% to 5.8%.

The Big Five independent oil companies represent over 20% of total current non-OPEC production so their failure to replace reserves and expand production represents a serious challenge for the global oil supply/demand balance. In comparison, global market powerhouse Saudi Arabia controls 10% of total world oil production and about a third of total production of the Organization of Petroleum Exporting Countries (OPEC).

Today, national oil companies (NOCs) control nearly 80% of global reserves of oil, and they also dominate global oil production. This raises questions about the ability of NOCs to meet growing global demand for hydrocarbons. OPEC production, which represents a lot of NOC output, is lower today than it was in 1979, despite growing demand and high prices. Moreover, there are serious questions about the capability of NOCs to use their resources efficiently, risking underproduction and higher prices. The problems afflicting a number of major NOCs include bloated workforces, expensive consumer fuel subsidies, and debilitating political interference. All of these factors reduce NOCs capability to return the maximum production per investment dollar.

The trend is that NOCs as a group have been moving away from partnering with IOCs for investment in their oil resources. This could mean two things:

- 1) If NOCs cannot increase their efficiency, world energy markets may be headed for a rocky future.
- 2) The center of global oil exploration and development activity may move away from Houston-based companies,

In order to maintain our edge as the world energy capital and sustain existing share of jobs in the global energy sector, Houston's energy companies need to do more to maintain their traditional advantages in technology development and promotion. This will mean a greater commitment to R&D spending and a renewed focus on innovation and product development.

Houston is the historic home of energy technology, thanks to its geographical advantages, the port, and the innovative industries that have made Houston their home base. Many of the most important technologies used in drilling and production around the world were developed right here in Houston. However, with the changes in the global oil market and moreover, with the shifts away from oil and toward alternative energies that appear to be drawing near on the horizon, Houston's prospects as an energy leader are becoming more and more precarious. If, with the shift to NOCs, Houston loses this globally competitive position, the city's potentially bright future will darken and diminish. As was the case in the aftermath of the oil bust in the mid-1980s, innovation will be the key to sustaining the energy industry in times of shifting economic landscapes.

Right now, Houston is doing great. In 2006, job growth in Houston

was double the national average. According to the annual survey of PricewaterhouseCoopers, Thomson Venture, and the National Venture Capital Association, venture capital inflows to Houston surged last year, to 30 deals totaling \$212 million.

Energy trading and lending is becoming an increasingly important segment of global financial markets. In the US as a whole, the number of energy hedge funds has risen almost threefold in the past three years, from 180 at the end of 2004 to now, at the close of 2007, over 530.

Now, let us not forget: Houston calls itself the “energy capital”, not “the oil and gas capital”.

Increasingly, other places—for instance, California, New York, and the coal states—are using public money and aggressive policies to promote innovation in energy technologies other than oil. If they succeed and Houston doesn’t step up its contribution as a player in the broader energy game, Houston stands to lose its status as the energy capital and with it, opportunities and jobs. Texas has been shockingly unsuccessful in attracting new federal grants for energy research; as of late, Midwestern states and California are winning the tenders. Our leaders must do more to ensure that Texas remains the center of energy innovation and business. Otherwise, we are going to see our mantle passed on to states now hotly competing in the energy research space. California, New York, Massachusetts, Pennsylvania, even Montana, are committing millions of dollars to energy innovation, research and development. Texas is lagging this effort.

For Houston to remain at the cutting edge of the energy business, it must consider how to maintain its position as the major player in the search of many new energy technologies, not just technologies for oil and gas extraction. Houston needs to explore its potential to lead advances in science and business in the energy sector.

Carbon control technologies are going to be a leading business opportunity. Houston, as a major center of energy production and electricity generation, is well positioned to take a leadership role in creating and testing new carbon control technologies.

Houston is also well-positioned to play a major role in energy science. One important step is to recognize the potential for nanoscale science for the energy industry—including enhanced hydrocarbon extraction, carbon sequestration, hydrogen technologies and renewable energy such as wind and solar. Rice University has established nanotechnology programs dedicated to advancing and improving solar and energy transmission technologies through the development of nanophotonics and quantum wire technologies. Nanophotonics uses ultrasmall structures—engineered to be as tiny as a strand of DNA—to improve the performance and efficiency of solar panels. Quantum wire technology uses infinitesimally small carbon-based tubes to carry energy across vast distances with little or no energy loss. This energy transmission technology will allow distant energy sources to be distributed economically as a stable energy source around the world. With the advances being made through nano scale technolo-

gies, solar power has the potential to be a significant contributor to the field of renewable energy.

Houston can, and must, tap into its position in nanoscale science to move itself into important and emerging areas of science and business.

In order to establish its preeminence as a leader in these new fields of energy technology, Houston needs to redefine itself as a center for energy science innovation as it has in the medical field. Houston can be a leader in reshaping the manner in which electricity is transmitted, stored and delivered to consumers, including innovation in fuel storage as well as in the hardware and software for distributive generation.

Houston is emerging as a major center for wind energy. Texas is the third windiest state in the country; therefore, it is no surprise that over 30 wind development projects have been implemented in Texas since 1992, with more than half of those since 2005. Texas has a jump start in the field with a major project in Nolan County that is poised to be one of the largest wind power projects in the country. Currently, wind generators in the United States produce about 6.6 billion kWh per year of wind energy. It is estimated that this could rise to 75 billion kWh in the coming years. Texas can do more to support and conduct research in order to position itself as a leader in this form of alternative energy.

On another front, nuclear business is growing in Texas. The Nuclear Energy Institute says Texas has a strong showing on its list of nearly 30 proposed nuclear plants in the United States, with six proposed for Texas, to be added to four currently operating plants. There will be strong demand to replace the existing nuclear technical facilities and specialists in the coming years. The United States is losing its abilities to build and operate.

Biodiesel is another means of alternative energy for which Houston has great potential to become an industry leader. Examples of regional development in this sector include Galveston Bay Biodiesel, a developer and operator of biodiesel facilities and Houston Biodiesel, which also plans to build a 35 million gallons a year biodiesel plant in Seabrook, Texas, working together with Lansing Ethanol Services LLC and Lansing Trade Group LLC. But massive federal research grants for biomass energy are being granted to state universities in the Midwest and West coast, instead of in Texas, despite its large agricultural sector and strong university base.

The bottom line is Houston political leaders and industry leaders need to get out in front on the energy technology issue.

The rapid pace of development within the renewable energy sector has forced the major oil companies to adapt and seek joint ventures with firms not normally associated with the petroleum industry. One example is the proposed joint venture between Tyson Foods (which formed a renewable energy division last year) and ConocoPhillips to produce, market and sell biodiesel originating from the fat of poultry and pork fat. Another is ExxonMobil Chemical, which has, in conjunction with its Japanese affiliate, Tonen Chemical Corporation, announced the commercial production

of microporous films as a separator for the batteries utilized by hybrid and electric vehicles. According to the *MIT Technology Review*, this new separator, which acts to keep positive and negative electrodes in a cell apart, will ideally keep lithium-ion batteries from overheating by slowing the reactions—allowing the battery to cool off, instead of bursting into flames. As also indicated within the *MIT Technology Review*, by improving the safety of lithium-ion batteries, such technology would allow car-makers to replace the nickel hydride batteries presently used in hybrids with lighter lithium-ion batteries, thus improving fuel economy.

Houston can be a leader in the alternative energy arena but the public policy framework for our future role as energy capital is critical. Houston needs tax incentives and other drivers to direct investment in future technologies. It should also expand the research and development infrastructure of the area and promote institutions that link businesses to technology. It should prominently host international energy technology and innovation meetings.

Houston can be the most visible, pro-active innovator in world energy, if there is a concerted effort to take up the opportunities that are emerging and available to us now. Houston, the energy capital of today, can carry forth this status as a global leader into a new age, and maintain its influence well into the future.

WELCOME

ISABEL B. WILSON

Good morning, everyone. If everyone will take their seats, we can proceed with the program. I am Isabel Wilson, president of the Philosophical Society this year. First of all I want to say, Welcome, welcome. We're delighted to have you all in Houston for what I hope will be a very stimulating program.



*2007 President, Isabel B. Wilson.
Photo by member, John Gullett.*

The Philosophical Society was first started, of course, back in the 1800s. It was re-started in 1937, as I think most of you know. So, this makes a sort of wonderful year, '37 to '07. I like the ring of that. And I hope that it will continue happily for many more years.

I am here this morning to welcome our first speaker and tell you a little bit about him, although I think most of you know him.

Our first speaker is James A. Baker III. He entered a career of politics and public service despite advice he received from his grandfather. Captain Baker, as the grandfather was known, was a very successful attorney with the law firm

that his family had started in Houston—Baker Botts. Were it not for Captain Baker, we would not be here today. Among his many accomplishments was the preservation of the endowment for the William Marsh Rice Institute for the Advancement of Literature, Science and Art, after the mysterious death of its benefactor. That institute of course is now more simply called Rice University.

Captain Baker often gave young attorneys like his grandson three pieces of advice: Work hard, study, and keep out of politics.

For much of his life, our speaker followed Captain Baker's well-intentioned axiom. He built a successful law practice and raised a family four sons. It wasn't until about midway through his life that a series of circumstances, and his friendship with George H. W. Bush got our speaker involved in politics, and then in public service. The rest, as they say, is history.

Since then, our speaker has been the only person who led five presidential campaigns, the only person who served as White House Chief of Staff, Secretary of Treasury, and Secretary of State. He is: the Treasury Secretary who helped Ronald Reagan direct one of the most significant restructurings of the nation's income tax system; the Secretary of State who helped the first President Bush conclude the Cold War, with a whimper and not a bang; and the co-chairman of the Iraq Study Group, which developed the only forward-looking approach to Iraq that enjoys bipartisan support.

The list goes on and on. During that time, he has been called Mr. Baker, the Chief, Mr. Secretary, and the Velvet Hammer. And I am sure there are some Democrats who have less savory nicknames for him.

I just call him Jimmy. After all is said and done, I am damned glad that Jimmy followed only two pieces of his grandfather's advice to young attorneys: He worked hard and he studied, but he did not keep out of politics.

Ladies and gentlemen, it is a distinct honor to introduce our speaker and my cherished friend since childhood, James A. Baker III.

OPENING KEYNOTE ADDRESS

JAMES A. BAKER, III

W elcome to the Baker Institute. We're delighted you're here this morning, and I thank you, Isabel, for that introduction. You know, folks, it's a real joy for me to be recognized today by Isabel Wilson, because she is one of my closest and dearest friends; I started to say, one of my oldest friends but at our age, that word just doesn't seem right.

But after all these years of friendship I have a secret about Isabel that I can share with you. I think I can probably trace the development of whatever diplomatic skills I have to a weekend that Isabel and I, and a half a dozen of our college buddies, spent along the Texas-Mexican border after a particularly spirituous—not spiritual, but spirituous—evening in Piedras Negras, when I had to talk our way back into Texas. Trust me, negotiating with Arabs and Israelis was much easier than my discussions that night with the United States Customs people at the border; I was having a little difficulty with my words, and the rest of my friends were not speaking at all.

Isabel of course is more than my close friend; she and her husband Wally have been and they remain invaluable supporters of the Baker Institute. As a matter of fact, their dedication to our Energy Forum is a major reason it is the premier program of its kind anywhere.

It's a real pleasure, ladies and gentlemen, for us to host you here today. Your Society makes significant contributions to the discussion of issues that affect our State, our nation and indeed the world; and we are honored to be joined by a few dedicated Texans who have contributed so much to our State's success.

I see our junior U.S. Senator, John Cornyn, and John, we're delighted to have you with us; I understand that David Dewhurst, our Lieutenant Governor, is registered, I don't see him out there but I would recognize him and Senator Cornyn and all of the other distinguished public officials who are with us.

Your organization is dedicated to advancing knowledge and understanding. I only made one race for public office myself; that's why I admire people like John Cornyn who go out there and face the voters and get elected. I always found that the appointed route was an easier route to take. But I never will forget running for Attorney General of Texas some 30 years ago, and I was in a small town out in West Texas and I was

making my pitch to the group, a small group there. And I said, "Two of the most significant problems facing the State of Texas today are ignorance and apathy." And I looked at this grizzled old rancher in the front row, and I said, "What do you think about that, sir?" This guy looked up at me and he said, "Well, now," he said, "I'll tell you, Sonny. He said, I don't know, and I don't care." That's a true story, John. That's not made up. Elizabeth Dole tried to steal that story from me some years ago.

Your forum today, "U.S. Energy in a Global Context" is certainly a timely topic, as anybody who reads the newspapers and watches television or drives a car can tell you. Here we sit today with crude oil hovering around \$90 a barrel and the world's financial markets fluctuating wildly, partly because I think of those skyrocketing oil prices.

Global demand for oil is expected to increase by more than 50 percent during the first 25 years of this century as we see China and India and other major emerging economies accelerate their own development. Our own consumption of petroleum, based largely on our transportation sector's huge reliance on it, will increase I think at a slower, but still at a very substantial rate.

Houstonian Matt Simmons has predicted that the world may soon reach peak oil production if it hasn't already done so. Now, whether Matt is right or not, I do think one thing is certain: developing safe and reliable energy sources to augment and supplant fossil fuels is a challenging test, and we are very much behind schedule.

Now, I'm not an expert on energy matters, and I don't stand here before you today pretending to be; so I won't discuss how we got to this critical juncture. And I'm sure not going to make any predictions about the future of oil prices; I used to be very leery of doing that when I was Treasury Secretary, and the same with respect to interest rates, and I'm even more leery of it today, now that I'm no longer privy to a lot of the information I used to be privy to.

Instead, I want to focus on four geopolitical factors that could jeopardize the flow of oil, and thus the price that we have to pay for it. I then want to briefly discuss ways that I think American foreign policy can be practiced so that we can effectively address the global challenges that confront us, including the global challenge of energy.

The first factor is that more and more petroleum reserves today are under the control of national oil companies. According to the International Monetary Fund, national oil companies had roughly 50 percent of global oil production in 2005, and more than 70 percent of global oil reserves. And those shares are expected to increase. While that is not necessarily bad, it does create the very real possibility that oil will serve as a bargaining chip for politicians who have non-commercial interests. In fact, I think you need look no further, frankly, than Venezuela, or perhaps Iran, to understand the point I'm trying to make about the potential for disruption.

A second factor that could limit oil supply is international terrorism.

We should not underestimate the determination of Al Qaeda, and other terrorist groups, to inflict damage on the global economy. Energy supplies and installations provide those groups with very valuable targets. We know that in December - we know this for a fact - in December 2004, Osama bin Laden directed his followers to attack oil facilities as part of his jihad against the United States and the West. To date, fortunately, we've been spared on this count, but we must never forget that what happened in New York and in Washington on September 11, 2001, can just as easily happen to the world's energy centers.

The third geopolitical factor that could disrupt oil supply is regional conflict, particularly conflict in an area of the world where it has often taken place, the Middle East. Last year, the Iraq Study Group heard from ambassadors from countries that neighbor Iraq. And many of these ambassadors told us they have a very serious concern about this. They told us that if the instability in Iraq should spill over to other Gulf states, Sunni-Shia clashes might well erupt all across the Islamic world. Although security in Iraq has improved considerably I think since then, such clashes remain a possibility. If they were to occur, we could expect I think a sharp drop in oil production, followed by a painful spike in oil prices.

And the fourth factor I want to mention is the possibility of monster hurricanes and storms that many scientists predict will be an unwelcome byproduct of the problem of global warming. The rigs and refineries that satisfy about one-third of the United States' oil needs are all along the vulnerable Gulf Coast. If Class 5 hurricanes became the norm, rather than anomalies, there could be many more episodes like the one which occurred after Hurricane Katrina, when our gasoline supply dropped 8 percent, and our prices rose to about \$5 a gallon in some parts of the country.

Now, extreme weather patterns of course are not a geopolitical factor; they're really not geopolitical in nature. But finding remedies to an issue like global warming certainly is. Dealing with global warming is just one of a complex matrix of global challenges that I think demand serious and prolonged attention from countries that are becoming more and more interdependent. Those global challenges also include but are not limited to the question of terrorism, the spread of weapons of mass destruction, mass migrations of workers in many countries around the world, and economic growth and stability, or the lack thereof.

Now, I would not suggest that the United States, nor for that matter even a small group of developed countries, has the wherewithal to effectively address these challenges. That's going to demand the sustained cooperation of many, on the international stage. But American leadership I would submit to you is going to be critical, and going to be a critical component of coordinating the myriad of major efforts that's going to be required.

So this morning let me offer you a few ideas: ten maxims, if you will, that could help the United States find its way to responsibly address these global challenges. And the first maxim I would mention to you is that I

think we need to be comfortable as a nation using our power. The United States occupies a uniquely preeminent position in world affairs today. You got to go back a long, long, way to find a time when one single nation occupied as preeminent a position in global affairs as the United States does today.

So maxim number one, we have to be comfortable using our power. In a very real sense I would submit to you we have no alternative, because if the United States does not exercise power, others will. We simply have too much at stake in the world to walk away from it, even if we could, and we can. I think this was true before 9/11, but it is even truer today as we combat those twin scourges of international terrorism and the proliferation of weapons of mass destruction.

We should also remember that the United States has proven itself to be on balance; we have proven ourselves to be a very powerful force for good in world affairs. That doesn't mean we're perfect; we're far from that. But we are a force for good. I remember when I was Treasury Secretary and when I was Secretary of State, how pleased people were when the United States was engaged, and how everybody wanted us to be engaged in international affairs; and everybody understood and recognized that we did not get into somebody else's sandbox or take over somebody else's area of influence.

You look at the major global conflicts of the last century: World War I, World War II and the Cold War, and the United States really played a historic role in defeating imperialism and totalitarianism. Other countries depend upon United States' leadership, and when there is no leadership from the United States, there is a serious vacuum out there. This of course is most obviously true of our allies in Western Europe and East Asia and elsewhere. But even countries that are sometimes anything but friendly, often seek our engagement.

Second maxim: We need to recognize that even U.S. power is limited. As powerful as we are, we cannot solve every problem in the world. Iraq, for instance, has shown the limits of our military strength. But our power is limited in other areas as well. As strong as our economy may be, and it is terrifically strong, we represent over 25 percent of total world GDP, we still need the cooperation of others in such areas as expanding trade and investment, and in macroeconomic policy coordination.

The same of course is true in the diplomatic arena, where our influence can be constrained, when we're not able to persuade others. Securing the support of China and Russia for instance, is going to be critical in crafting a response to Iran's nuclear programs.

Third, we should be prepared to act unilaterally when the situation requires it. Unilateral action after all is the surest and best test of a great power. But we should never, never undertake unilateral action lightly. For reasons that I will discuss in a moment, I think it is almost always preferable to act in concert with others. But when our vital interests are at stake, we must be prepared if necessary to go it alone.

We did that twice, as I recall when I was in government. The first time the United States ever used force in the aftermath of the Vietnam debacle was in Grenada by President Reagan. It was very difficult. But we didn't tell a lot of people what we were going to do; it was the first time we'd done it since Vietnam.

I never will forget an incident where we were briefing. We pulled the Congress together to give them a briefing about what we were going to do in Grenada, and President Reagan wanted to make it meaningful; so he invited them all up to the Yellow Room in the residence. At that time, we had a Republican Senate but a Democratic House. And this was at 11:00 at night, the night before the action went down. The action went down about 3:00 a.m. the next morning. So we briefed the leadership, and at the end of the briefing Tip O' Neill stood up and he said, "Mr. President, thank you so much for that briefing," he said, "But that's not consultation; that's notification. Good luck." And he stood up and walked out of the room.

So the point I'm making here is that there are times when we have to act unilaterally. We acted unilaterally and quite properly, in my view, in Panama, when we had that thug down there, Noriega, beating up on our servicemen. There are times when that needs to happen. But we ought to, if we possibly can, try to cobble together allies to help us out. We need to.

And that brings up the fourth maxim: we need to appreciate the importance of those allies. It's no coincidence that the three great global conflicts of the 20th century that I mentioned earlier, World Wars One and Two and the Cold War, were all won by coalitions. It's good to get coalitions because by securing allies, policy makers can achieve some very important goals. Most obviously, if you have partners, you can spread the human and the financial cost of any action; you can create what could be called an efficient division of international labor.

Again, back to the Gulf War of 1990 and 1991, we had a military coalition there, composed of the United States, Britain, France, and even many Arab countries, and others as well. But that was bolstered by financial support from Gulf Arabs, the Japanese, the Germans and a number of other Western Europeans.

In addition, I think allies can help secure legitimacy for your actions. In the case of that Gulf War in '91, the U.N. Security Council's authorization of force prompted support for action against Saddam Hussein, not just in the international community but in the Congress of the United States as well.

And that was even perhaps more important. I daresay we never would have gotten the approval of the Senate, back in those days, which was a Democratic Senate, had we not first gone out and gotten, in effect, an authorization from the rest of the world. It put us in the position of going to a senator, and saying, "Senator, you mean, you're not going to support the President of the United States in this action, but the President of Ethiopia is going to support him?" It was very meaningful.

Maxim number five: We need to use all of the means at our disposal. And when I say all of the means I'm talking about tools such as moral suasion, bilateral talks, multilateral action - those actions can occur through formal institutions such as the U.N., like the war in '91; NATO and the IMF. But it can also be pursued through informal groups like the coalition against Iraq during the '90 and '91 Gulf War; or like the coalition that did what we did in the Balkans during the Clinton Administration.

Effective foreign policy embodies a continuum of action; a continuum of action from private demarche to military action. In short, I guess the point I'm making is that one size does not fit all when it comes to foreign policy. And this is especially true today, as we confront those twin threats that I'll mention one more time: international terrorism and the proliferation of weapons of mass destruction. We need a comprehensive approach. Military action has got to be part of it; but it is quite evident I think, that military action alone cannot be the solution.

Sixth, we need to be prepared to change course if necessary. Now, we're doing just that now in our Iraq policy. We are talking with Iran and Syria; we're talking with Iran at a lower level. We need to be talking to them, frankly, at a little bit higher level. But we're talking to Syria in a more meaningful way than we were a few months ago, and anyway we're talking to both those countries.

And we're actively pursuing peace between Arabs and Israelis, something that we were not doing last year, before the Report. And we are changing course by surging our military posture in Iraq, and doing so with quite a degree of success. We can only hope that the success we are seeing, the increased stability, will last, as it will ultimately have to do to begin to responsibly draw our troops down.

So we are changing course. But that maxim is very important: we need to be prepared to change course when the circumstances require it. You can argue that consistency is an important element of foreign policy, and it is because it permits you to move beyond crisis management and it facilitates the development of long term strategies. Consistency can also foster stability by reassuring allies and by setting down clear markers for potential adversaries. But when events change, we really need to be prepared to change with them.

Best example I can give you is the rise of Mikhail Gorbachev in the Soviet Union in the latter years of the Cold War. That marked a dramatic shift in the world's view of the Soviet leadership; and therefore it was only right that Washington under Ronald Reagan reach out to Moscow in ways that were unimaginable just years before that.

Number seven: We need to recognize and accept that the United States must sometimes deal with authoritarian regimes. In a perfect world we could perhaps work only with other democracies. But unfortunately, this is not a perfect world, and there is absolutely no sign that it's going to become perfect any time soon. To be very blunt about it, sometimes we have no choice but to work with governments that fall short when it comes to Democratic practices, or the protection of human rights.

The most striking example I can cite for you, from history, was our World War Two alliance with Stalin's Soviet Union. This was one of the most murderous regimes in the history of mankind. Given the immediate and deadly threat posed by Nazi Germany, we really had no alternative.

During the Cold War, we made common cause with authoritarian regimes in Latin America, in Asia and elsewhere. Even today you look around our allies, some of our strong allies in the war on terror include countries in the Middle East and Central Asia that bear scant resemblance to Jeffersonian democracies. Now, I can't pretend that this is a satisfying state of affairs; it isn't. But it's reality. And there is simply no alternative to it.

Number eight: We need to be prepared to talk to our enemies. I've often said that you don't negotiate peace with your friends; you negotiate peace with your enemies. And I don't say this because talking *per se* is a good thing, although I suppose there is something to be said for maintaining a bilateral dialog, if only to avoid misunderstanding and missteps. And I don't say this because talking alone is a strategy; it's not. That is not a strategy. No, the fundamental reason we should be prepared to speak to our enemies is that it is in our interest to do so. We're doing that today. President Bush just wrote a letter to one of the biggest thugs in the world community, Kim Jong-il of North Korea. We didn't talk to him for six or six-and-a-half years; now we have something going. Whether it will pay off or not, we don't know. But at least there's something going there, we have some hope, might give us an opportunity to end the North Korean nuclear program. And it would never have occurred unless we had started talking to North Korea.

So we need to talk to our enemies because it is in our interest to do so, and not do so in a weak way or in a way seeking appeasement, but do so in a tough and strong and knowledgeable way. This is why we maintained an embassy in Moscow, for the 40 years of the Cold War. And this is why even so staunch an anti-Communist as President Reagan was prepared to negotiate with the Soviets. Nobody ever accused the Gipper of being squishy when it came to the Soviet Union. Talking to hostile states, whether it was the Soviet Union during the Cold War, or Syria today, is simply not appeasement; don't let anybody tell you it is. It was and it is good foreign policy.

Number nine: We should be mindful that values are very important to U.S. foreign policy. But they are not the only thing. Promoting democracy and free markets is the paradigm of our foreign policy. Promoting democracy and free markets is rightly central to U.S. foreign policy. And that's because a freer, more prosperous world is a better world, for our own citizens and for people everywhere.

But we should not be deluded into thinking that progress towards democracy and free markets is either inevitable or without its own strains. The example of World War I is very sobering. It followed immediately on the heels of a period of unparalleled economic integration, that some called the First Golden Age of Globalization. One of the most influential

books of the prewar period, Norman Angell's, *The Great Illusion*, argued that general war had become impossible because of the economic advantages to peace. We know there are economic advantages to peace and stability, but this book argued that general war had become impossible because of that. Yet we know what followed. What followed that book was one of the bloodiest periods in human history.

So what's the lesson? I think the lesson is that we should be very wary when talk turns to inevitability. Because what man creates, man can destroy. Moreover, both democracy and free markets can be decidedly mixed blessings in the long run or in the short run. Economic reforms can lead to strains that prompt populist backlashes. Nor can elections be counted upon to produce stable and responsible regimes. The popular success, for instance, of Hamas, among Palestinians and Hezbollah in Lebanon are cases that are directly on point.

You are probably wondering if I am arguing that we should not support democracy and free markets, and the answer is, of course not. We absolutely should. They should remain the paradigm for our foreign policy; they should remain the ideal for our foreign policy. But that should not be the beginning and the end of our foreign policy. We should be especially careful of underestimating the difficulties that countries can face as they embark on the path to democracy. And above all, my friends, we should remember that in foreign policy, stability is not a dirty word.

Tenth and last: We must always remember that domestic political support is vital to any successful American foreign policy. And that's because the will of the American people is the final arbiter of foreign policy in our democracy. Generating and sustaining domestic support for foreign policy is in every way as important as the policy itself. Without that support, specific policies risk repudiation at the polls, or public disenchantment with foreign engagement in general. Ladies and gentlemen, let me make one thing very clear. I am anything but a declinist when it comes to the United States; because I am absolutely convinced that our country's future is a very, very bright one. I am convinced that we have the leadership, and the determination and the grit to tackle our energy problems just as we tackle other global challenges. We have demonstrated that leadership and that determination and that grit throughout our history. But to do so, I have suggested to you an approach that does not fall easily into the traditional categories of foreign policy; that is, either realism on the one hand, or idealism on the other.

This idea of mine contains the best elements of both. It embodies one of our most distinctive national characteristics. We Americans are a practical people. We are less interested in ideological purity than we are in solving problems. Whether we're talking about promoting Mideast peace, expanding liberalized trade and investment, or addressing the problems associated with rising petroleum prices.

What I propose in these ten maxims that I've mentioned to you this morning, I think could be called pragmatic idealism. While it is firmly

grounded in values, it appreciates the complexity of the real world, a world of hard choices and painful tradeoffs. But such an approach does, I am convinced, offer our surest guide and best hope for navigating this great country of ours safely through this precarious period of unparalleled opportunity and risk, in world affairs.

Thank you all for being here this morning; it's been a delight to be able to speak to you.

GLOBAL ENERGY IN THE 21ST CENTURY

KENNETH MEDLOCK, III, *Moderator*

ANDREW SLAUGHTER, ROBERT HARRISS, CORBIN J. ROBERTSON, JR.

DR. MEDLOCK: Welcome. It's never an easy thing to follow Secretary Baker, but I will certainly do my best, and I'm sure the gentlemen up here with me will do their best as well. We are actually very pleased to have each one of these individuals with us. They're very knowledgeable about the issues they're going to discuss.

Secretary Baker mentioned the ideal of peak oil in his talk. And certainly it has been something, with increasing energy prices in general, that has been on the minds of many people in the energy business. Whether or not you adhere to its precepts is really not relevant; it is an issue that's on the table and it's constantly being addressed in the press, trade press more generally, and by energy executives around the world.

The question that arises when we think about dealing with peak oil is, what do we do? Where do we go from here? If we are indeed approaching a peak in global oil production, what does that mean in the context of global energy? What does it mean for achieving transportation services? Is there another technology that we might be able to switch to, that would allow us to continue the unprecedented levels of economic growth that we've seen over the past 100 years? So this is certainly a very important question, and it's something that I think in one way or another each one of the panelists today will address.

Our first presenter today is Andrew Slaughter. He holds the position of Senior North American Energy Advisor for Shell's Global Business Environment team, and Senior Economics Advisor to Shell's North American E&P business. He is responsible for strategic counseling and analysis of North American crude oil and natural gas markets, covering both short and long term fundamental issues. He works closely with other Shell businesses in North America to develop common regional views of energy markets, so he's very well versed in lots of things that are fundamental to energy markets, not just crude oil and natural gas but other things as well.

He currently serves on the Economics and Statistics Committee of the American Petroleum Institute, and was active in both of the recent National Petroleum Council studies, the one on North American natural gas markets that was released in '03, and "Facing the Hard Truths" which

was just recently released. And the latter study is actually what he is going to speak to us about today.

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ANDREW SLAUGHTER

Thank you. Good morning everybody. It's a great pleasure and honor to be here in front of such a large and distinguished audience. I'm very pleased to be able to talk to you this morning. What I'm going to do is give you a very brief overview of the recent study completed by the National Petroleum Council and made available this year, this summer in fact.

For those of you who don't know, the National Petroleum Council was a body that was set up in the immediate post-World War II period, around 60 years or so ago. Its sole function is to act as an advisory body to the Secretary of Energy, in terms of medium and long term energy policy issues. It only does research and studies at the request of the Secretary of Energy, on topics which the Secretary thinks is important. So it's not an organization which is driven by an agenda, which is driven by a particular point of view; it brings together experts in the field, to do a serious, detailed, neutral analysis of important energy issues.

The most recent study, "Facing the Hard Truths About Energy," its genesis was in 2005 when the Secretary of Energy commissioned the study. I'm going to talk to you in one moment about the specific scope, but if you think back to that time, mid to end 2005, energy was a very important topic. It still is, but the signs of it were coming to the forefront of policy thinking. Crude oil prices had gone up in mid-2004, from the \$30 range to the \$50 range, gasoline prices in the United States were approaching \$2.50 to \$3, unprecedented levels for the consumer. We were seeing the rise of what we now know is resource nationalism, in countries like Venezuela and Russia. We were seeing the continuance, the ever-worsening continuance of tension in the Middle East, one of our key oil-supplying regions. We were seeing a surge in tensions in the Niger Delta region of Nigeria, with the armed militias. Again, a threat to oil supply.

There was a lot of concern about the long term position of whether oil is going to continue to flow against these constraints, and under what conditions. At the same time, as Ken mentioned and as Secretary Baker mentioned, the notion of peak oil was beginning to be discussed very widely. Is the actual sub-surface resource of oil robust, to supply our needs long-term. So against all these concerns, the Secretary asked us to look at some very specific long-term issues, related to energy, particularly oil and gas. And he sent a letter to the National Petroleum Council in October 2005, to kick off this study.

So the first question relates to the resource. What does the future hold for global oil and natural gas supply? And we interpreted that as: Is the subsurface resource sufficient to supply this country and the growing

economies of the world for the foreseeing future? The second question related to deliverability. Can we translate that resource into crude oil and natural gas flowing through the supply chains to the consumer, to the economies at a reasonable price, without jeopardizing economic growth? Because anything can be done if you adjust economic growth downward, but that's not palatable for any society today.

The third question, more practically, having done this analysis, what are the implications for the United States in terms of the policy levers it can activate to ensure energy continues to flow, and therefore economic growth and prosperity can continue in the manner at which we're used to?

Now, these are fortunately very open-ended questions, and it allowed us to structure our study in a way that really addressed not just the oil and gas system, but the energy system in total. Because you can't talk about oil and gas without talking about other parts of the energy system. What is the potential for nuclear power? What is the potential for coal? What is the potential for renewables? What happens in these areas will all affect what happens to demand and supply for oil and gas. So we very quickly opened this out to a study of the global energy system in its greater complexity. Now, there are many, many aspects to this problem. We organized the study in four big teams, one looking at the supply side; one looking at the demand side; one looking at energy technologies in a lot of detail; and another one looking at geopolitics and policy issues, all of which come together to deal with energy security. And as I just mentioned, to assess oil and gas we have to look at the alternatives to oil and gas. So what is the real potential for biofuels, for nuclear, for coal, for other renewables?

Under all these considerations, you can look at it through three lenses. You can look at it through the economic lens; how can these energy supplies be developed at least cost, and therefore to provide lowest price, to support the economic growth? But then, you have to look at it through the security lens; can these oil and gas supplies, these energy supplies, continue to flow under a variety of security environments going forward? And finally, and not less importantly, the environmental issues associated with energy supply. We've lived with them for a long time, but now we have the overprint of the carbon concern, the global warming concern, and we felt we have to address this in the study as well.

Energy is a function of economic concerns, security concerns, and environmental concerns. What solutions can we find that will address all these three together? There are many, many other studies that have come out on energy and with energy themes. Why is this different? We think it's different because it's a very, very detailed, integrated look at all of the work that's been done so far.

We looked at over 100 existing studies, analyzed them, found out what they were predicting for the future, and in looking at such diversity of studies you can really identify what the differences are, therefore what the important issues are, and what choices you have to make to move this in one direction or the other. We had a great diversity of expertise. We had

350 people working more or less continuously on this piece of work, for about 18 months. We reached out to a lot more companies, individuals and sectors, but about 350 people from very diverse backgrounds, across the energy spectrum from energy suppliers to energy users, consumers, NGOs. And then finally, we did a very detailed assessment of the state of the art, on a suite of energy technologies, both current energy technologies and energy technologies which might come in over the next 25 years. So this fundamental, detailed analysis we think has a broad coverage which is unprecedented in any of the studies you see that are more narrow-focused. We were able to produce a very comprehensive, in-depth report on this basis.

Now, you might be surprised, 65 percent of the participants in the National Petroleum Council were not directly from the oil and gas industry. They were from the renewable industry, from the coal industry, from the NGO sector, from governments, from academics, from foreign governments, foreign sectors. We had contributions from India, from China, from Saudi Arabia, from Mexico, coming to our meetings and giving us their perspective; people from the International Energy Agency.

So basically we were fortunate to have a lot of different, expert perspectives from many different points of view to add to our depth of coverage, and I think at the end of the day to our credibility as a product. Just to give you an idea of the impact of this, we announced the findings of the study on July 18, put it up on the Web, and we've had almost a million downloads. This is not the most recent number; I think this is by the end of October. We've had almost a million downloads of study material going to all types of different users and sectors, be it in government, industry, or overseas. So this has really made a huge impact, and I think it's informing the policy debate, and the company debate, and the international debate about energy now; and it will set an agenda for quite some years to come.

What I want to do now is take you very quickly through what we learned. We called these "The Hard Truths" because, quite honestly, the challenges in continuing to develop the energy sector over the next 25 years are getting more challenging and more complicated to address, particularly when you compare it to the last 50 years, when we seemed to have seamlessly been able to grow our energy supplies in sync with our economy and without too many disruptions.

The first hard truth is that global demand growth by 2030 will bring an energy market 50 to 60 percent greater than it is today. This is because the growing populations of what we used to consider as the Third World or developing economies, are reaching or have reached their economic takeoff phase, and they're consuming more and more energy. They want to consume more and more energy to lift their living standards towards what we would consider a more Western standard. Now, that's very legitimate and it's real, and if you go to China or India or Indonesia or Brazil or Russia, you'll see it happening. That level of growth over this time frame is unprecedented and unstoppable in the energy sector.

The second hard truth has to do with the role of coal, oil and natural

gas, the traditional fossil fuels. These make up about 75 percent of our energy mix today in the world; they will continue to dominate over the next 25 years. The debate in the public place, as it were, seems to be dominated by how we can promote renewable energy, how we can promote low carbon energy, maybe how we can bring back nuclear energy. These are all very valuable parts of the energy mix. But the truth is, we're starting from a point where fossil fuels, the traditional backstop of the energy supply, will continue to dominate, at least over the next 25 to 30 years. We cannot neglect giving these industries the means to continue to supply; the world depends on fossil fuels, and will continue to do so for some time to come.

The third hard truth is about energy resources. We did not find evidence that the world is running out of energy resources in a geologic sense, at least in the time frame that we're looking at. What we did find evidenced of is that there are increasing, diversifying risks to developing the oil and gas supply, and the coal supply, from conventional resources. It's getting tougher, it's getting more complicated, there are more stakeholders, lead times are getting longer, investment is getting higher. It's getting tougher to deliver the incremental molecules of fossil fuels than it was ten years ago, 20 years ago, 30 years ago.

As you bring other things into the energy mix, those things also face tough challenges. New infrastructures, new value chains, new partners, new technologies. It is not a simple matter just to say that we're going to switch from petroleum-based fuel to a biofuel-based fuel. It is very, very complex and tough to do that. Therefore these risks create significant challenges to meeting that 50 to 60 percent demand growth of the next 25 years. It's a legitimate question: Will we be able to get there at an acceptable price and maintain economic prosperity? So despite the preponderant role of fossil fuels, because of the inherent risks, we absolutely must encourage other things in the energy mix. And that's working on the demand side through energy efficiency; there's a lot of low-hanging fruit in Western economies, particularly in North America, with regard to energy efficiency in buildings, vehicles, industry and power generation. We must seize those opportunities. They're relatively low cost; they're relatively independent on new technology. There are many energy-efficiency technologies today which are available, but which are not deployed.

Secondly, we must encourage these other fuels to take their place, whether it be biofuels, solar, wind, nuclear, and the unconventional side, more of coal, oil, and natural gas. Everything has a challenge, and the challenges diversify as you diversify the energy mix. So this is why we say, meeting the energy challenge is going to be very tough, very hard over the next 25 to 30 years.

We look at energy globally, and we still see debate in policy circles about whether energy independence is a good thing or an achievable goal. Looking at the interdependence of energy in the world, energy independence is not a realistic goal, and it's not necessary for energy security.

All major demand countries whether it be in North America, Western Europe, or the growing demand countries of East Asia, their energy security will all come from promoting supply, moderating growth, and strengthening the global trade and investment schemes. Having supply chains be invested in on a level playing field across the world, this is how we get access to the most cost-effective, most efficient energy supplies. So energy security is a legitimate goal; energy independence we think is not a legitimate goal.

We looked then quite extensively at the capabilities of the industry. One of the worrying things we found, one of the main capabilities that we have are human capital, in engineering, in geoscience, in infrastructure engineering. That human capital is disappearing fast; we're an aging workforce. We need to replenish, retrain, restock our workforce with experience. And that's going to potentially add a new challenge to the next ten years in our time frame.

Then finally, I mentioned the environment as a concern. We don't take a position at the NPC about global warming; that's not our role. But certainly during the course of our study it became increasing obvious, whatever your views about that, governments are going to have to take a more proactive role in terms of carbon management, maybe some kind of carbon constraints, technically, maybe some kind of economic measures to curb carbon emissions. The carbon issue is not going to go away, and it needs to be dealt with. So we looked at how that could be done; we came to some conclusions about what are intelligent, coherent ways of addressing the carbon issue.

Now, this is a very quick overview. In the time we've got this morning I don't have time to go through everything in depth. But I just want to give you flavor of some of the key data that we looked at. This is the range of outlooks for global oil supply and demand over the next 25 years, out to 2030. These come from the EIA, a U.S. government agency, which shows global oil demand rising from about 85 million barrels a day today, to about 120 million barrels a day by 2030. Those dots you see on the right hand side of the chart, those come out of a range of different studies. You can see that the range is from about 130 million barrels a day down to about 80 million barrels a day. There's a 50-million-barrel-a-day window of uncertainty, potentially, about how much oil we're going to need. That is huge. That's two-thirds of our current global oil supply, a huge range of uncertainty. This comes from the fact that people look at the data in a different way. You see at the bottom there the outlook from the Association for the Study of Peak Oil. These are the people that think subsurface resources really are a constraint, and we'll no longer be able to build the oil supply. So they basically say, Well, oil is not going to be there, the world has to adjust to a lower oil supply environment. The message is that all these outlets are legitimate, but they're looking at the same data in a different way. And there's a huge amount of uncertainty around the base data.

We surveyed international oil companies to look at what they thought. And aggregating their survey, they came to 107 million barrels a day in 2030. We don't know if they thought their economic growth was lower, or the supply was harder; but basically that's 10 million barrels a day below the public agencies, which is the size of a Saudi Arabia supply today, so hugely important in terms of the range of uncertainty on this. Now, if you look at the resource side, this shows the plentiful oil resources, but the concentration is really in the Middle East and the Caspian region. If you add unconventional resources, what we call the heavy oils, there's a lot more of these in the Western hemisphere, in places like North America and Venezuela. So developing things like oil sands, bitumens, oil shale will be beneficial from a regional supply perspective, and just adds more diversity to the mix. So we think this is a positive set of options.

If you look at oil trade, it's shifting. Here we see what it was in 2000. If you look at 2030, given where the conventional supply is, there's a potentially much greater set of supply points from the Caspian and the Middle East. This basically opens up the possibility that we're subject to global choke points like the Strait of Hormuz, the Strait of Malacca. This looks at our exposure to risk and security and resource nationalism. It's a similar story on gas, where global LNG trade will increase in magnitude, but will also tend to migrate to the Middle East and Southeast Asia, therefore increasing our exposure to these choke points.

Here we have what I mentioned earlier, the human resources challenge. We've recruited in the '60s and '70s, stopped recruiting in the '80s and '90s, and so basically half the U.S. workforce is eligible to retire in the next ten years. If you look at it globally, many other regions are in this situation. The only surplus regions in terms of geo-science and engineering are the Indian subcontinent and Latin America. So Western Europe, Russia and North America pretty much have this problem. We absolutely must replenish the workforce, and it's going to take time.

So I want to turn very quickly to five key strategies which we can use to address these. First of all, we're talking about moderating demand by increasing energy efficiency; in the vehicle fleet, in the building fleet, in the residential-commercial sector. There are many technologies available to do this, and they're relatively economic today, and relatively available. So how do we deploy, that's the question.

Secondly, expand and diversify U.S. energy supply. By that I mean, energy supply which is available within this region, be it unconventional oil, unconventional gas, coal, biofuels, potentially nuclear. How can we make the most of what we've got, in those areas.

Thirdly, strengthen global and U.S. energy security by going out and promoting consumer-producer dialog, by promoting fair trade and investment regimes, by promoting open investment, by making sure that that's in everybody's interest.

Fourthly, reinforcing our capabilities on the workforce side; our skill sets. On the data side, let's have a much more comprehensive, updated,

common view of the oil and gas resource, energy resources generally, and figure out how to develop it so that governments and policy makers around the world have a common view of what is possible.

And finally, address carbon constraints. We need to do that in a way which encourages technical solutions like carbon capture and sequestration, but also economic responses via carbon tax or a carbon cap on trade scheme, something that gives the right signals to the industry, to consumers, to make the right choices about carbon.

All of these strategies are essential, there's no easy solution; you can't cherry-pick. I just want to finish off by looking at how this might play out, and take the example of oil. This is the United States' oil demand, business as usual rising to about 27 million barrels a day of demand by 2030, and the traditional liquid fuels basically flattening off, slightly declining there. If you add unconventional oil, you get a little bit of growth in that curve. But there's still a big gap between domestic supply of liquid fuels, and our demand. Traditionally, that's all been based on imports, and import growth has been inexorable. Imports are not bad, but they expose you to different challenges and risks. So what we're saying is that we can eliminate, mitigate that wedge by working on the demand side, moderating demand growth through efficiency. In the vehicle fleet alone, if you deployed the currently available technologies on vehicle efficiency, by 2030 you can bring 4 or 5 million barrels a day out of the system and slightly smaller amounts by working on the building sector and the residential sector.

And then at the bottom, expanding and diversifying domestic resources, for example bringing biofuels into the system, where it makes economic sense, and probably that's more promoting second generation biofuels, cellulosic biofuels, rather than relying on corn-based biofuels, which drive up the price of corn, and cause conflict with the food chain.

Doing those things on the supply side and demand side reduces your risks in terms of exposure to global markets and global trade, and allows you to better pick the risks and challenges you can most readily and effectively mitigate. And that's our outlook, and that's our recommendation going forward. All of the five strategies must be addressed together. It's not just a U.S. problem. Western Europe and other major economies are facing the same issues. We must do this together through early action and sustained action over 20 years or so.

You can find out more about the study, the report, summary materials at the website and you can actually submit questions to the NPC through the website comments@npc.org, and they will be answered by the experts. Thank you.

DR. MEDLOCK: Thank you, Andrew. Let's hold our questions until the end, because I think some of the questions that you may ask might be cross-cutting for the panelists. It might be interesting to have them all address the questions at once. Our next speaker is Robert Harriss. He's

the president of the Houston Advanced Research Center, also known by many around here as HARC. Bob actually received his Ph.D. in geochemistry from Rice University so he too is a Rice grad. Welcome back again. I know you've been around more often than not. We're very pleased to have him here. He holds adjunct appointments as well, as professor at the Department of Marine Sciences at Texas A&M University Galveston, and the College of Architecture and Planning at University of Colorado in Boulder.

His current personal research interests, just by way of background, include the design of disaster-resistant and resilient communities, applications of information technologies, gaming and new media. It's a lifelong learning about disaster preparedness and recovery, and the design of technology pathways to a future bio-economy. Bob was an ISI highly cited scientific author in 2003, and he participates in a variety of professional service activities, including contributing editor to *Environment*. He's on the editorial board of the *Journal of Earth Science*, *Earth System Science Education*, the National Science Foundation, the Geosciences Advisory Committee, the National Science Foundation he served as chair, the Geosciences Advisory Subcommittee on Education and Diversity, and the National Science Foundation GPRA Advisory Committee.

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ROBERT HARRISS

Thank you very much, ladies and gentlemen. I'm honored to be here today as the guest of the Society. Being a Texan myself, I think the institution is incredibly important to our State, and to thinking deeply about the issues our State faces. Senator Cornyn, thank you very much for being here on a Saturday and working hard on benefitting our State; we appreciate that very much.

I'm going to take a little different track in the sense that I'm not going to disagree with my colleagues who've spoken, but I'm going to stretch the time horizon a little bit. I certainly believe that if we use the technologies that are available to us (fossil fuels, renewable energy, nuclear energy) we're going to be able to hold our own for a while. But we're going to see that in the long term, and by that I mean on century time scales, problems such as climate change and perhaps more importantly, sustainability; the need to raise human well-being on this planet will overcome our capability to supply the necessary energy at a low cost in a way that is resilient to the threats that Secretary Baker discussed in terms of natural disasters and in terms of being socially acceptable.

Energy is not just a technology issue. We talk about it all the time, especially those of us in science and engineering; we talk about the technology pathways, the cost benefit of technologies. Frankly it's every bit as much a social issue, a philosophical issue, a risk management issue, which is

certainly a human decision-making issue, as it is a science and engineering challenge.

I would like to use a few pictures to give a visual impression of the challenge ahead, especially the challenge of making the planet sustainable for all, both people and nature. There's a fleet of satellites that fly, looking down at the earth, taking pictures of the lights. Now, it's a defense meteorological satellite series originally developed for military applications to look at intermittent lights, especially flashing of explosions or rockets taking off. It's now being applied to problems like identifying energy use, energy efficiency, disasters and how they affect infrastructure, for example, both in terms of the immediate recovery and reconstruction.

This is a picture of the Earth taken in the late 1990s. The white areas are, as you can see, those areas that are highly urbanized, based on electrical grids. These night lights show up very nicely and give us a pattern, essentially a footprint of the human society as it exists today on Planet Earth. There are also a lot of dark areas there; we have a lot of nature left. It's very important to keep in mind that we need to keep watching that balance between the areas that are illuminated and those that are not.

Here's a simulation that was done by some colleagues of mine and they took the night lights and they assumed in a simulation that we could instantaneously raise the 6 billion people on this planet to a quality of life and a set of energy services that would make them all live an American lifestyle. You can see a very dramatic difference here, as you would expect, and we can highlight those areas where the change is most dramatic. It reinforces what several previous speakers have discussed which is that there's a global challenge to provide energy, but it's especially pronounced in South and East Asia, some parts of Africa, South America, Mexico, the rapidly industrializing and developing nations.

This is a visual picture of where we need to go, and we need to think about the pathway there in terms of time; it's going to take a hundred, maybe 200 years, because we'll certainly not get there very quickly.

The global warming issue has been raised several times. It is a challenge for us to manage this issue; it can be managed and it will take not only science and engineering, but it will take effective policy and organizational implementation of policies. This is the driving force, many of you have seen and heard about the growing CO₂ concentrations. This is over the last thousand years, with data taken from ice cores in the Arctic and Antarctic and from direct monitoring, which is the red line, which was initiated by a student at the University of California San Diego; his name was Charles Keeling, and in 1950 he wanted to measure carbon dioxide, his professors and the federal government, for whom he has funding to set up a station on Hawaii, said, "Sounds like a boondoggle to me. Go to Hawaii? Why do we want to measure carbon dioxide in Hawaii? It doesn't react; it's not a pollutant."

Well, he was very, very determined, and thank goodness. He's put together the most quantitative, highly verified data set that exists on

Planet Earth. It's become the flag that all the global warming community looks to for verification that the science is totally necessary to back up the challenge that we face. Keeling is honored in our community.

Just a few comments on what we mean about the accumulation of carbon dioxide. You can think of the atmosphere like you think of a bathtub: it has inputs, there is carbon coming into the atmosphere, and it has outputs, things that are drawing carbon out of the atmosphere. Over many millions and in fact billions of years, the Earth adjusts itself, it's an adaptable system, so that the carbon being released from plants decaying and from upwelling of the ocean where gas is exchanged between the ocean and the atmosphere comes into balance with newly growing plants; everything is in a nice sort of balance.

What our use of carbon has done is to put the system out of adjustment, out of balance, and our challenge is to get it back into equilibrium. I'm convinced we can do that. We need to know that about 50 percent of the carbon dioxide that is emitted is still taken up by nature, by the oceans and the forests of the planet. That is very important because it means that our challenge is less so. Now, we are worried that the capacity of the ocean and the forest may not be sustained over very long time scales, but right now, it's a very important factor that diminishes the magnitude of our challenge.

Once we get that extra carbon dioxide in the atmosphere, it's like a blanket. We're putting it in faster than the ocean and the forest can take it out, so it accumulates and it's a blanket and it traps additional gases as do other things in the atmosphere such as water vapor, methane gas, nitrous oxide. There are many of these greenhouse gases on Planet Earth; on Venus, on Mars, the atmospheric trapping of heat is common.

What is the challenge then? There's a lot of technical work that's been done. It's resulted in a Nobel Peace Prize for former Vice President Gore and the IPCC, and Academy Award for PowerPoint. These Power Point slides won't, but "An Inconvenient Truth" did.

This is a diagram which, on the vertical axis, shows you the billions of tons of carbon that are going into the atmosphere. In the year 2000, we were putting in about seven billion tons, almost a ton per person per year, going into the atmosphere. The orange line that is going straight up is what will happen if we just continue business as usual. The amount of carbon that's being put in will continue to escalate, because demand for energy is escalating as we continue to grow and prosper. That's one of the consequences: we need more energy.

Now, society faces a challenge of deciding what the trade-offs are between the current types of energy we use, and the amount of carbon dioxide we feel comfortable allowing to accumulate. So all of those other curves going from the blue one at the top, which would allow our atmosphere to more than double its carbon dioxide concentration, to the ones that show the dip down in the bottom where we would take dramatic actions, very expensive actions, and draw down the atmosphere to almost its current concentration, have costs associated with them.

We can move very aggressively and fast but it will cost more. We can move more slowly and it may cost less and provide more time for a lot of innovation, but there's a risk. Most climate scientists feel that it's very important, if we're to avoid dangerous impacts of global warming, to stay behind 450 and 550 parts per million. That's the yellow line, that's the one that kind of peaks and then flattens out. So they're saying, to be careful we should stay in that mid-range there and not feel that we have to take dramatic action, but also it is an urgent problem.

If we use all of the energy technologies that have been discussed in terms of fossil fuels, energy efficiency, implementing the nuclear technologies that we have today and have on the drawing board today, wind, solar, so forth, that is very significantly important to diminishing the rate of accumulation, but it does not stop the increase in carbon dioxide in the atmosphere as we look out over the next century. Based on some modeling by the Pacific Northwest Laboratories and the University of Maryland, and many others, there's a need for some really radical innovation in technologies if we're going to achieve a future where we're comfortable, that we're going to avoid that dangerous threat of global warming, or if we're going to fail humanity in not providing adequate energy for sustainable development.

We simply have a big challenge ahead of us. It's a challenge that needs to be initiated now, because if you look historically, we've learned that it takes on the order of 50 years to turn over major technology, or to introduce an innovation into our technology stream in the energy business. This is for both technical reasons and economic and social reasons. So we have a big gap, and we need to be very imaginative. Now that's a good thing, I believe, because it will inspire students. They like to take on really big challenges; we're all very idealistic. When I was at Rice, Sputnik was the reason that I was inspired to go to Rice and to get into my career.

I want to bring this back to Texas, because we can somehow, I think, typically relate to our own State better. If we implement very aggressively our renewable portfolio standard, in terms of renewables, if we implement energy efficiency very aggressively and successfully, CHP has combined heat and power and other technology in the energy-efficient area. If we do all of those things as well as they can be done over the next 20 years or so, we'll hold our own.

Our CO₂ emissions will be pretty level. Well, that means they're still high in terms of their contribution to the growth of CO₂ in the atmosphere, because we've got that tap wide open; we're closing it down about halfway, but the output is staying the same.

So we're still increasing CO₂, just more slowly than we were before. So the message is, the pathway that we've discussed so far today is a holding pattern and will not do anything rather, it will only delay the potential consequences of environmental change and the fact that human beings will not have adequate energy.

Here's the problem we face that I call the social problem. There's no one of these technologies, and Andrew made this point very well, that will

work; there's almost not any technology we can put on the table today that someone doesn't object to. Whether you're in Maine or you're in Texas, or California, you can pick your technology and somebody's going to say, "I don't want it where I can see it. I don't want it on my property. I don't want it next door."

This is why I think that quite often the institutional issues, the policy issues, the social acceptance issues are every bit as or more important than the technology. And I have seen this happen over and over. In the energy-efficiency arena, it's social acceptance. There's a lot of ways you can reduce energy consumption, but it requires a change in the habits of people who build houses. It requires a change in the architects; it requires a change in so many different users, and change is difficult, difficult for all of us.

We'll have to make the best of the existing suite of technologies, use every single one of them. It's not an either-or. But we're going to have to find some way to be more innovative. And that's the real challenge. We've got to really push forward. First thing we need to do is to improve our capability on the management and policy side. We have too many tensions that exist, and everything that is new and different tends to get wrapped up in sort of an endless battle. And we're not very effective at carrying out a dialog which is productive and can get past some of these. It's just the politics of energy is certainly a very big challenge, as is the politics of many international issues. This is one where I would say the technology and the engineering has gotten out front of our ability to negotiate and manage what future we really prefer, in terms of these various elements that I list here.

Unfortunately innovation is one of those areas which we talk about a lot. We've had some wonderful examples of innovation in the information technology issue area, but we have not been able to do the same sort of innovation in many other areas. Part of that is because some of these energy technologies are so upstream that they simply cannot go out and be expected to be supported by markets in time periods less than decades. So there's a need for national security and for environmental reasons, to make funding available to support the development of these truly innovative technologies for a much longer period than we're currently doing.

I think biofuels is a good example where we're really on the edge of having a major market failure. There is so much speculation about what may be an outcome ten or 15 years from now that all of the potential feedstocks that people are looking at, with the exception of cellulosic ethanol, are about to collapse. Biodiesel is in trouble. Companies have built refineries and now the feedstocks are all too expensive; the *Houston Chronicle* had a nice article on that.

So again we have a social and a political set of issues which are not in keeping with stimulating innovation. We have organizations that are hierarchical. In doing government service, I experienced this in NASA, where everything is in a box, the boxes compete with each other vigorously and we end up not making much progress in an integrated sense.

We need to deploy all of these energies, these energy technologies and they need to be properly integrated. And if every program official who's responsible for wind or geothermal is going to say, "Mine is better than hers," well, then we end up in a real situation where we make progress in the wrong way much too slowly.

So there's going to be a different way. It's going to be collective, as we've learned from information technology; it's going to be collaborative. A lot of the technologies in the future may essentially be put on the market at very low or no cost, and the services will be the profit, which is what we've learned from this wonderful information technology world we live in.

Here's an example of integrative technologies at the household level, where no one is putting photovoltaic on the roof or putting a wind tower in the neighborhood. Now none of these alone are going to do much to help. They're intermittent technologies; they will not work if you keep doing them as individual technologies. What you can do is package them, bundle them together because their intermittency often can be overcome because they're complementary. I did some work on the Rosebud Reservation with a community there, the Lakota Tribe. In the Dakotas when you put up a wind tower, your main energy production is when you have storm fronts moving through. It's very windy; it's very cloudy. During the summertime, when the winds diminish there's day after day of sun. So you can get some complementary systems in place. Then you have to have backup, which is going to be fossil-fuel driven.

We shouldn't think just of the technologies that produce the energy, but the entire end-to-end system. Our transmission system, our infrastructure for managing how we get energy from its source to its user, is really in deep trouble along with many other infrastructures. They are antiquated and they need to be upgraded in many ways. We now have the control technologies, the smart technologies, that if we put in the infrastructure, we can really make some enormous progress in being more efficient and more effective with the smart use of an integrated future technology system for producing energy that's low cost, resilient, and will serve not only the United States but the world.

Here's an example of some far out ideas. These are things that we'll see at the end of this century, but the one on top shows a bundling of some of these renewable energies: wind energy, photovoltaic arrays, and we're using that renewable to generate hydrogen; we're putting that hydrogen into various storage systems. Energy storage has got to be part of the package and it's got to be developed in an integrated way so that it moves along at the right pace to be there when we have the capability to generate a particular source that needs a storage system.

We also need to be able to have an efficient transmission system; the one we've got now is terribly inefficient. You lose far too much power along those lines, and Bucky Fuller suggested long ago a global electrical grid, a superconducting grid. That was one of the things that Rick Smalley, our wonderful Nobel laureate here at Rice University, thought was one of

the most exciting ways to overcome the energy challenge and that nano-technology might be the crucial component that we need to implement this superconducting electrical grid out over the next probably 50 to 100 years. In Bucky's imagination, and he was a very imaginative person in many ways, we could eventually connect the planet. That opens a lot of opportunities for using intermittent energies as the day and night occur.

Now, I hope we do those things. I hope we inspire our young people with enormous challenges, saying that we don't have the technology we need, you've got to innovate. We're going to provide the support for you to go to school and study policy and study institutions, organization and management, and technology, and how to put it all together. It's going to be very interdisciplinary. They will be excited by that. That's a whole new way of learning that most of the students coming into campuses today are ready for and they want to work in a collective and collaborative way. If it doesn't work, my colleagues in the field of global environmental change are looking at what they hope is not going to be necessary: climate engineering. The final frontier, I say, and I hope we don't get there. But there are a number of ways, with only preliminary studies, of modifying and protecting the Earth from moving outside of acceptable limits of climate change.

One of the things, this is one that is probably the most reasonable to explore further, is to be able to increase the amount of particulate material high up in the atmosphere which would either enhance cloud formation and reflect sunlight back, or would directly reflect the sunlight back from a highly reflective, very small particles that would stay in the atmosphere as volcanic dust does, for years at a time. Other people are talking about fertilizing the ocean and getting biology to pull the carbon out. There are many innovative ways of carbon capture and storage in addition to those that we'll be doing in the near term, which involve very deep injection of liquid carbon dioxide into the sea.

Now, all of these have consequences. The challenge now, so that we're properly prepared if unfortunately these are needed, is to start a serious investigation of these and truly understand not just the technical tradeoffs, but the risks that are associated with each of these, and what the appropriate processes are to have our political leaders get the information and take society's values and make judgments on whether these would ever be implemented. We should realize that this is something important, it is a major issue to be thinking about.

Finally, I wanted to summarize by saying I think there is an agenda. I don't think we can implement it well with the current structures we have in place. I think we need to consider the possibility of a whole new organizational framework for looking at the future of energy innovation. This is being studied in Congress. I hope there will be some action, because simply reorganizing departments or bringing departments together will not do the job. I'm confident of that, and I think we need to think of a whole new way.

DARPA is often mentioned, and in fact DARPA does have some aspects

that would fit into this more innovative approach. But it's certainly not a one-on-one mapping. I'm not an expert on how you would design this, but I hope those who are experts in organizational design and management strategies will really work hard on this.

I think the thing to do is to obviously start with the things we know best, and I wanted to comment on carbon capture and storage. Scott Tinker, who's the director of the Bureau of Economic Geology at the University of Texas, was here at the Greater Houston Partnership talking about their carbon capture and storage program. He made the point that in the Gulf Coast, where we have taken out a lot of oil and gas out of the ground, there is the existing infrastructure and the layer of materials from which all of that oil and gas was taken out. That is a completely reasonable place to be putting CO₂ back into the ground. The industry knows how to do it.

He told me that there is enough capacity in the Gulf Coast sediments off of Texas and Louisiana to take in the amount of carbon dioxide, the total amount of carbon dioxide that will be produced in the next 100 years in the United States of America. Now, that may be a little bit of an exaggeration. But even if it was half as much, that helps extending fossil fuels out by giving us time to make possible this innovation that we need to take care of.

I think carbon capture and storage is important, we should not delay much longer and we shouldn't overregulate it. We can learn by doing. That's our best way forward with something like carbon capture and storage, where we have vast expertise in this field.

Renewables. I've tried to make the point that we need to integrate them; let's quit putting individual wind turbines here and photovoltaics there. *Let's bundle them together and put them on a smart grid.* That will totally eliminate the problem of intermittent production once we get all of that put together.

I haven't said much about nuclear; I'm not at all an expert in nuclear. Certainly there are next-generation nuclear plants on the drawing board that will deal with the most important problem of all, and that is the proliferation of nuclear weapons and the production of nuclear materials which is a hugely important challenge. We have to, if we're going to go forward with nuclear, make it less likely that those materials will get out to people who have diabolical reasons for wanting them.

I will finish by saying that this climate engineering, and perhaps other radical technologies that are a century or two away, solar power, satellites, are things that we should explore. We should open that door, but it should be a very inter-disciplinary discussion. Not just a science and technology discussion. It's very important to think about those in the context of our vision for what we want society to be like in the future.

We have a very serious situation with far too little funding for these sorts of endeavors. I know all scientists, and most people who are in academia, are always crying the blues about funding. I think this tells the

story here, that we have seen declining and/or flat funding in the energy R&D area for a very long time in this country in real dollar terms. And yet it is fundamental to the future of our nation and Planet Earth. We get a wonderful benefit from the private industry in this sector, but again their investment in R&D also has been flat, and has not been increasing.

I think it's urgent that we find the resources to take care of the problem, which is the platform that everything we do depends on. The same is true in climate change science, we desperately need to put into effect a monitoring system so that we know what the feedbacks is and how things are operating, and that gives us a sense of how to pace this program of innovation.

DR. MEDLOCK: Our last speaker on the panel, last but not least, will address some issues that I think everybody has raised regarding coal as a fuel and its potential for the future. Corbin Robertson is the chairman of Quintana Minerals Corporation. He is a member of the board of directors. He also serves as the CEO and chairman of the board of GP Natural Resource Partners, which is the general partner of Natural Resource Partners, since October '02. The rest of his bio is actually available for you to look at, and with that, I'll turn the floor over to Corbin.

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MR. ROBERTSON

Well, thank you. Let me first say that I'm here because of Isabel Wilson, and she and Wally have been my friends and neighbors for years. Whatever she's for, I'm for. Isabel is someone that I hold in the same regard as I hold my mother. That's the highest regard.

I'm honored to be on the panel. I'm not an academician; I'm an investor in the energy space, and have been very active in the oil and gas, and coal business throughout the generations. We have both public and private partnerships that own the coal. If you own Natural Resource Partners' publicly traded stock, you are my partner. Some of you are partners in Quintana Energy Partners, which is a private equity partnership that has invested in energy and space. We've been active as investors for my entire life.

How did we become large coal owners? Back in 1969 my Dad decided that we ought to invest in the coal business because as chairman of the Texas Oil and Gas Association he recognized that the rising imports would be a threat. In 1973, when he went to the members of Congress that he had been talking to about our growing dependence upon foreign oil and reminded them of his warnings. They said, "Well, we're not going to blame this on us; we're going to blame this on you."

They've done a rather remarkable job of tainting the industry ever

since; but it's been pointed out often, we are dependent on foreign oil. Our dependency grows. We are dependent now on foreign natural gas; our dependency grows. Our declining gas fields here in the United States have caused our foreign imports from Canada to have grown from 3 percent to 17 percent. Canadian imports have basically stabilized, and will probably decline as its growing need for using natural gas to process its tar sands increases; we will be further dependent upon LNG imports.

Looking at our resources here in the United States, coal is what we have. This is a very important resource to us. In 1969 I graduated from college and the first field trip I took was to go buy a coal resource called the Priest property near Louisa, Kentucky. Let me give you a little color of the coal fields; most of you are here from Texas and haven't had the good fun of tramping around Appalachia. We met an offset operator to the Priest property, a guy named Chuck Hovater, who mined the neighboring property. He was an absolute outlaw. If you had to say "reclamation," he wouldn't know what that was. But we went to him, and he was sitting there at his desk, with a double-barreled shotgun, and I looked at it - I've been in several offices around Houston and some in West Texas as well, but I hadn't seen anybody with a shotgun immediately available to them.

So I asked him, "Well, sir is that loaded?" He said, "Why, yes. If it wasn't loaded it would need to be." So they operated up in Appalachia a little bit differently than what I'd experienced here in the oil patch, and so I took note of that, and we opened up our first coal mine. Now that was my first ex-brother-in-law that opened up the coal mine and unfortunately he opened it up in a place that had some Civil War works. We went back and we drilled it and found someplace that had been worked many, many years ago and we opened up the mine again, and we had a really lucky break.

The miners went out on strike after 90 days. Maybe you said, "Well, gee. Why was that a lucky break?" Well, we were mining the coal for \$7 per ton and we were selling it for \$5.80. We didn't think we could make it up by volume, so we took the equipment and we contributed to a venture that we had with Bill Mullen, who still remains as my partner in the coal business, called the Wolverine Venture; he was from Michigan so he named it after those mighty Wolverines.

We ended up making a great success out of that venture with equipment. And the Priest property that we owned, we leased it to Dick Hooper and Harry Hale Rainier. Dick knew how to sell coal; Harry Hale had the equipment to mine it. And they made a great success out of the Priest property, so we decided, being from Texas, it may be better to be the royalty owner than the operator.

That thought has stood us very well. In '86 when the whole world fell apart here in the energy sector, we went out and bought CSX Minerals, which was a very strong position in Eastern Coal. CSX was the amalgamation of 80 railroads. And each one of these railroads would buy a piece of coal, and they'd put in a tippie and a little spur to it. So across all those railroads, they accumulated a very important property and had a lot of

good metallurgical coal, of course, in addition to the steam coal. And it gave us a very important place in the Eastern markets.

In '92 a friend named Ralph Bailey who still serves with me on the National Petroleum Council, was trying to put by the Western Coal reserves that had been a federal land grant for building the Great Northern Railroad. The company is now Burlington-Northern. They had spun the assets off to Burlington Resources. We were fortunate enough to make a deal with Ralph, and we went forward and bought that property. That's five million mineral acres that has about 21 billion tons of coal in five Western States.

We have coal properties in 14 states; it's about 22 billion tons of coal that we control. That's probably 8 percent of the coal in the United States. And we are checker-boarded in these Western properties with the federal government, the GNP coal reserves that you see on the map, represent ownership of every other section. Whatever coal we have, the Feds have coal in that same proportion.

These coal reserves for the 20 billion tons that are measured, are within 180 feet of the Earth's surface, so they can be easily strip-mined at a very low cost. Senator, it's the largest stranded asset, low-cost energy asset in America. The reason it's stranded is most of it is in lignite, and that lignite can't be shipped because it combusts. So we are looking at ways right now to utilize this important energy resource. We're working with the State of North Dakota. They've funded half the development cost of a project to gassify this coal and put it in the Northern Border pipeline, which is about 15 miles from our site in North Dakota.

And I'll get more into that later, but the resources that we have in the United States are really quite important. We are a significant player and an important participant in the industry. Great Northern Properties leases out coal; our Natural Resources Partner leases out coal to coal producers. The coal operators that mine on our property produce 6 percent of the coal in the United States from our property; these same operators produce 70 percent of the coal in the United States in total. So we have a very interesting place within the coal industry, and have a good understanding of what's going on across the board.

Why is coal important? What's our place in the energy profile for the U.S.? The U.S. fossil fuel reserves: 94 percent of our BTUs are coal, three percent oil, three percent natural gas. The U.S. has 270 billion tons of coal. Our annual production was 1.2 billion tons last year, so it is a very important stake, about 23 percent of our overall energy comes from coal, or about half of our electricity.

Coal is used not only for making electricity but also for making steel, so it's a very important component to the steel industry. Oil at \$60 a barrel is worth \$10 on a BTU basis for natural gas, is worth \$160 a ton of coal, on an equivalency BTU basis. Coal sells for \$50 a ton versus oil now which is \$100 a ton, or not quite, \$90 probably today, a barrel. And natural gas is probably \$7 or \$8. So it is cheap BTUs relative to oil and

gas, and it's domestic. So as you address Secretary Baker's concerns about domestic supplies, it is an asset that we need to work.

Coal mines have been around forever. What is the controversy? It is a major source of fuel, and it does pollute. The cost of electricity is very low if you would compare the cost of electricity in states that are very dependent on coal at five cents per kilowatt versus the non-coal states which are 19 cents per kilowatt. It's a significant savings.

So how can we use coal in a way that is going to be environmentally sensitive? Many of us are trying to address this issue. You may have seen the "Coal is filthy" ads, and what's wrong with coal's place within our energy mix. Aubrey McClendon at Chesapeake was the one that was paying for the ads. Yes, there was some coalition that was against it, and of course many environmentalists like to bash coal. But the guy that was paying for the ads and has made a national campaign against coal is the founder and CEO of Chesapeake.

This is a gas versus coal competition. Now coal puts out CO₂ when you burn it; it probably puts out anywhere between twice as much to four times as much CO₂ as burning natural gas. So the idea that you're going to burn natural gas instead of coal and you're not going to have any CO₂ is not very thoughtful.

But the truth confirmed by the study that has been discussed here by Mr. Slaughter, is that we need all of these resources to make our economy run. The facts are that oil produced about 40 percent of the CO₂ emitted, 40 percent of the CO₂ emitted gas and combustible renewables account for the other 20 percent of the CO₂. So two-thirds of that comes from gas and then the other third comes from combustible renewables.

Oil, gas and coal account for 91 percent of our overall energy. Nukes are 6.5 percent, hydros are 2.2 percent, and then the renewables are less than 1 percent, when you consider the whole energy complex. So the facts are that hydrocarbons are going to rule our economy.

The CO₂ emissions also come from deforestation. The forest absorbs CO₂. The deforestations in Brazil, Indonesia and other places in the world are 20 to 25 percent of the problem. Animals produce CO₂ from cow manure, etc. CO₂ emissions from animals are 10 percent of the problem. If you really want to do something about it, don't exhale.

CO₂ comes from natural causes like volcanoes. Dr. Hugh Ross and Dr. Jeffrey Zweerink studied these ice sediments that dated back 4½ million years. The Earth's been here for over four billion years so their studies are significant. They found that every hundred thousand years there would be a cycle: there would be cold for 90,000 of those years, and then for 10,000 it would warm up. And they speculated that the causes of those changes were tectonic activity, erosion, the change in the Earth's biomass, and sunspots.

We are currently putting a lot of CO₂ in the atmosphere. Should we do something about it? Yes. I absolutely think it's something that we ought to be trying to address. As you would think about it, coal is being seriously consumed in places like China. Let's back up here and say, "Well, gee,

what are we going to do about the Chinese building all these coal-fired plants?" They're building a coal-fired plant a week. And if you've been over there you recognize that people are walking around with masks on to protect themselves from the pollution.

Look at Pittsburgh 50 years ago. Just as polluted as Beijing. But China has a developing economy, and they're doing what they can afford. After they've brought their people up from a subsistence level, they may do more to clean up the environment, as has America.

Wally, I don't know if you remember in the 1960s when the Ship Channel caught on fire. Houston's Ship Channel caught on fire in the '60s. We've done quite a bit to clean up America in the last 50 years, guys, and we can afford to. The worst pollution I've seen in the world is in places like Russia and China that have very poor economies and they can't afford it. Everybody wants to live in a better environment, including the Chinese and the Russians; but if they can't afford it, they're going to go for feeding themselves and raising their standard of living and having jobs first.

The point is, from a geopolitical standpoint, the U.S. uses 28 barrels of oil *per capita*, per year; the Chinese are at 1.7 barrel of oil. So, sinners, it's going to be hard to poke them in the chest and say, "Hey, guys, you all go clean up your act." The Indians are less than a barrel of oil per capita. Frankly, both of these economies have got educated people and a very strong desire to grow their economies and live like we do. God bless the Internet. The worldwide economy is all linked together, and they all know what we have and want it.

Secretary Don Evans and I were over in China last June. We went out to see this family that lives in a little mud hut in a village outside Xian. After an hour and a half drive from Xian, we were in a small village where the Chinese are living down at the subsistence level. Don brought them a computer. He's been out to see the family four times. Their two sons are blind - he's been trying to take care of them.

The first time he went to China, the Premier said, "Go west and see what China's all about." And he did that, and sort of adopted these two kids. Now he's given them computers, so they can study on these computers and do their work, because they're blind. It's a wonderful thing. But their computer are in this little mud hut in the middle of Nowhere, China. And the whole world is connected, and they see what we've got, and I do agree with the one of the speakers that said, "There's no stopping them." And so the demand for energy is going to continue to race, and the supplies are going to be competitive for the rest of the world.

Now, Senator, wind credits run out in 2008. You ought to renew them. The truth is you can't buy wind turbines for the generation of wind power. They're all taken between now and 2008. The tax credits for coal conversion are unfunded. So they've authorized in the energy bill a couple billion dollars' worth of tax credits. But so far, they're unfunded. The tax deductions that come with them are unfunded.

So as a developer of a billion-and-a-half dollar plant, we don't have any assurance that we get tax credits for it, even though there's a bill that

was passed that said you would, and the DOE loans that may be available aren't funded, we've applied for one. And so if we're going to make these conversions, it's going to take a lot more will; it's going to take a lot more effort and funding.

Let me talk a little bit more about sequestering CO₂ while we're on that subject. The Department of Energy gave me a study that said a thousand gigatons can be stored in deep saline formations, 900 gigatons can be stored in depleted oil and gas reserves. They're currently studying how much could be stored in coal seams that exist. They think it's going to be a place that they can store CO₂. They're actually drilling and trying to do sequestration on some projects or some coal that we have in West Virginia. So that's being studied, but it hasn't been demonstrated.

Well, how big is CO₂ sequestered storage? The CO₂ that would be sequestered if you got all the CO₂ that we're emitting here in the United States, would fill up Lake Erie by the year 2050. If you said, "What would you need between now and 2100," you'd need 5 percent of the land mass in the United States to be able to find the geological place to store it. So the size of the problem, how many tons of CO₂ are coming from all sources, is a very daunting task.

What can we do about it? We can build plants. I'm going to tell you, I think investing in technology is going to be very important. The Dakota gasification plant was built in the Jimmy Carter era. He came out with an \$88 billion subsidy back when oil was \$40 in 1981. Some of you will remember that. One plant got built and is still operating out of that whole program. They quickly scrapped the Carter Program for Alternate Fuels when the price of oil went down and so nobody invested in it.

The Dakota Gasification plant basically is sequestering CO₂ in the Weyburn Field in Canada. It is producing gas that's stuck in a pipeline, and its nominal cost is probably around \$3.50 per MCF; probably what it costs to produce the gas out of the coal field.

This is a look-alike to what we would be undertaking. They're using the Lurgi technology; we would be using British Gas Lurgi technology. British Gas spent about \$500 million on the bottoms so the plant actually slags, the difficult materials that are hazardous wastes come off the bottom of Lurgi. Lurgi is being used around the world, in 70 percent of the gasification that's being done today in the world. Lurgi is the most common technology that's being used.

In any case, this is the technology that's used here. British Gas basically has found a way to slag the bottoms of it so that you could even use it for road-building material. I went to Germany and saw where they actually have a plant of commercial scale being operated, and it's working fine.

So that's the technology that we would be using. It also works on lignite. Shell has a technology that we've studied that works on higher ranked coals. Probably as a sweet spot it would be the Powder River coals with their sub-bituminous coals. Conoco-Phillips has a process that probably works well with pet coke. GE's process works best with bituminous coal. Their process which was purchased from Texaco. They're actually

in China; they still call it the Texaco process. China has three coal liquid plants that are being developed. One's almost ready for startup. And they must have another 20 of them on the drawing boards.

So we are talking about gasifying coal and liquefying coal in the United States. They are doing it in China, they are doing it in South Africa. They are doing it in Australia. So in terms of where is the leadership for this new development of technology, it's not here in the States; it's going on around the world. The world is moving forward on these initiatives and is going to be demonstrating the Shell technology in a couple places.

What we can do about our energy needs will depend upon technology. Senator John Dingell's bill to tax carbons would dampen consumption. I know politically it was like committing suicide, but the cap in trade system that they put in Kyoto has been totally ineffective. The CO₂ emissions have gone up from all the countries that are in the cap and trade system. Seven billion worth of trades changed hands in 2007 but so far it's not had any impact upon how much carbon is being emitted.

When you look at the globe, cap and trade is not a big deal. Although politically cap and trade is probably what the U.S. is going to do about CO₂ emissions, it's not going to have an impact on the Earth to do that. If you would actually just tax it and say, "It's going to cost you more to use energy," your constituents probably wouldn't like it, but it would dampen consumption.

The way to reduce CO₂ emissions in the atmosphere is to dampen consumption. John Dingell is not my closest political ally, but I thought it was courageous coming from an automobile state, to recommend a simple tax on CO₂ emissions. I respect John Dingell's integrity. He's honest and a good man. I don't know what the chances of that bill passing are; I'd say it's probably slim and none.

What is the industry doing? There are many different ideas that we're looking at. A technology that we are considering would blow some stuff in the smokestack and get the CO₂ out of emissions. Taking CO₂ out of existing smokestacks does not have economically viable technologies. But people are working on it. Blowing some stuff in the boiler; there are ways to take stuff out, mercury and some of the sox and nox. These haven't been commercially demonstrated but are being tested.

There's a lot of hope and promise. When is this hope and promise going to be real? I'm going to tell you; it's 50 years before you can commercially bring real solutions to the market that will be widely accepted. So the thought that we're going to do something the next legislative session is not very accurate in terms of what our hopes and dreams could be. Could we do this between now and 2030? Well, we can make a good dent in the effort. But in terms of actually turning around the whole world and economy that's based on burning hydrocarbons is going to be a daunting task.

Let me leave you with one thought for the future. *Popular Mechanics* came out with the cost to drive from New York to California. Using gasoline it was going to cost \$212. Using E-85 it was going to cost \$225. Using natural gas to make E-85 it was going to cost \$619. Using biodiesel

it was going to take \$231. Using compressed natural gas where you just compress the natural gas its own self is \$110. And using one ton of coal to make electricity and then run off electricity would be \$60.

Now, with this gasification of coal, let me leave you with a thought. Three gas streams come off coal gasification. A syn-gas stream comes off, a CO₂ stream comes off that you can sequester like they did in this picture in North Dakota and a hydrogen stream comes off. Gasifying coal is going to lead to a hydrogen economy. It's a cheap source of hydrogen if you've got a use for the CO₂ like doing enhanced oil recovery, which we will do in the Williston Basin. And the use of the CO₂ in the syn-gas, you can make electricity or you can convert it through a methanization process into natural gas, put it in a pipeline and use it for whatever purposes those are.

And as you look towards the future, I think the hydrogen economy, and not burning hydrocarbons, is something that is a meaningful hope. But you're talking about 50 years before you can replace combustion engines and go to something of that magnitude; and hopefully my kids and grandkids will be around to see that sort of thing happen. Thank you.

DR. MEDLOCK: We have about ten minutes to field some questions from the audience.

Discussion:

AUDIENCE: I have a question for Mr. Slaughter. I'm Van Robinson, retired from a career in petroleum. In 2003, Shell estimated peak oil wouldn't occur until 2025 or later. But in contrast to that we have a cottage industry of retired geologists like Campbell; people like Boone Pickens and Mr. Matthew Simmons all saying that peak oil has already occurred. So in light of all of these studies that you've referenced in your talk, what's your own estimate of when peak oil will occur?

MR. SLAUGHTER: Well, the problem is, the underlying data is quite uncertain. The world relies on resource estimates, mainly produced by organizations like the U.S. Geological Survey. Their latest world estimate was published in the year 2000, based on 1995 data. And they categorized this as a P-50 resource, which is a mean expected resource; a P-90 resource, which is pessimistic; 90 percent chance that the resource would be greater than that; or a P-10 resource, a 10 percent chance the resource would be greater. We're looking at aging data, and people can sample into that data different levels according to their degree of confidence.

What we assessed in the study was that the degree of uncertainty around that data was very wide, and governments, companies, industry actors need a more up to date, better assessment of energy resources. Basically we don't know when peak oil is going to occur; we don't know the impact of it, we don't know if it's really a meaningful concept. What we said is that we need to update on a more inclusive, more systematic, more timely basis, the underlying data assessments.

AUDIENCE: I'm Tom Barrow from Houston, and I have a multiple set of questions. Is anybody else concerned about the Russians' attempt to get all of the Arctic Ocean? My second question, has anybody really thought through the economics of enforcing or causing the private sector to use solar panels to reduce the amount of electricity needs that the private sector currently is using? Thank you.

PANELIST: Well, there is certainly a lot of interest in the future of the Arctic, and the Canadians are positioning themselves to be very aggressive about territory in the Arctic, as are many Scandinavian countries. I think the Russians will have plenty to deal with when we come to an ice-free Arctic, which will be part of the global warming that we see. This past summer was the first time there's been a clear pathway through, and people are certainly preparing to take advantage of that.

That raises a point about global warming that is important to keep in mind. There will be winners and losers. There will be some people who will have benefits, and there will be some people who will be severely impacted. So it's not a clear cut issue where the risks are equally distributed.

And the Arctic is a good example of that. One other thing about the Arctic is that it may be one of the major reservoirs for what are called methane clathrates; it's a form of natural gas that is in an ice form. That could be a very important way of moving towards a hydrogen economy if we can figure out a way to harvest without damaging the environment, the methane hydrate deposits.

AUDIENCE: Will McCorquodale. I have a rather tough question for Mr. Robertson, being someone who produces and looks for energy. In an ideal world, a complex question: What should the United States government do to address some of the problems that you've brought up, and some of the other panelists. Is there a simplified formula for what you might recommend?

MR. ROBERTSON: Well, as I said, John Dingle has a bill to tax consumption. I honestly think that would make a difference. In Europe and Asia, the price of gasoline is taxed very heavily. And I do think that we ought to have CAFÉ standards, and I think that is something that is going to happen, and it should apply to suburban areas as well.

But I think that as government policy, those taxes could be used to help balance the budget but they also could invest in some of these new technologies in a significant way. It shouldn't all come from government subsidy, though. The government ought to be asking free enterprise to make the right decisions, in terms of demonstrating some of these plans; each of these technologies should be demonstrated. Whether the Shell technology is demonstrated in China, or in the United States, after it's been demonstrated, I think you can understand the commercial application of it.

So the government doesn't have to incent all plants everywhere, but should certainly give significant tax breaks. We've had a foreign company,

I won't say who, come to us about investing in building an 80,000 barrel a day coal to liquids plant in Montana. That's about \$10 billion. So it's a serious undertaking; a billion and a half dollars for the gasification effort we're doing in North Dakota is a serious undertaking. What do you do to encourage the capital markets, and what kind of price support could you have on a coal to liquids plant? At \$42 the plant would be marginally economic. At \$100, it's wildly economic.

But of course in South Africa, where they didn't have the ability to import oil to meet their gasoline demand, they've switched to that technology 25 or 30 years ago and it's actually driven their economy. If we pretended like we were South Africa and said, "What do we have to do to defend ourselves?" There is a huge coal resource in the United States that's available for further development.

Look at the impact that would have in North Dakota, Montana and some of these other places; serious money would need to be invested in infrastructures and communities and schools and the things that would happen.

Just as a side note, we studied wind power out there on the Great Plains, and if you asked how much wind power can you mix into the electrical generation grid and still maintain some economics you can only take about 8 percent because the wind blows intermittently, and you can't justify the billions of dollars of investment in transmission on 20 percent utilization of that resource. It has to be underlain with some sort of coal-fired or gas-fired or nuclear-fired or some other fired kind of capacity. There's an enormous resource there of BTUs. What do the coal resources we have add up into BTUs? It's 150 percent of the whole U.S. natural gas reserve.

So there are some very significant resources that the United States has not tapped that it could tap, in terms of government policy encouraging private enterprise to develop those in a thoughtful way. Conjunction with the states and the local governments, I think is one of those initiatives. It's not the only one, as has been pointed out by Andrew's studies, everything is needed.

AUDIENCE: I'm John Gullet from Abilene, and my question is that earlier we heard from Professor Jaffe that we're staring in the face of a need, worldwide, for massive amounts of energy. My question is, to what source, carbon or non-carbon, probably not taking into account the cost of extraction, because they would be technologically bound and probably in evolution, but to what source of energy, carbon or non-carbon, should we be looking to supply that much energy?

DR. HARRISS: Well, I'll take a first shot at that. I think what we've all been pretty consistent in saying is that we need the whole array of technologies we're aware of today. But that's not sufficient, so my proposal was to explore other opportunities that are going to be 50 to 100 years out, and that it's not just the individual technologies; it's being much smarter about putting them together and integrating them. There is an initiative

that EPRI, the Electric Power Research Institute, is leading on behalf of the utility industry, to develop these smart tools that will help with some of the intermittency problems in terms of finding complementary ways of having them turn into a reliable source.

So it's two things: it's pushing the frontier of technology, bringing the best and brightest in to work on that, both in the science area and in the policy area, and it's also integrating, end-to-end integration and thinking holistically. But we have a whole society that has been really thinking about individual components, not how you put them together, but how you make the most from your particular endeavor, whether it be coal, oil or wind. They don't talk to each other enough, and everybody's very busy, so how do we make that leap where we begin to become more integrative and smart about using the whole suite?

We can achieve that energy level within this century; I'm convinced of that, if we have best use of what we've got and some dramatic innovation.

AUDIENCE: But I don't think you can overlook the political resistance to some of these forms of energy. I mean, there is political resistance to nuclear energy. Whether it's rational or not, is beside the point, the system reacts to it.

There's political resistance to coal; there's also a lot of political pressure for coal. But I just don't think you can take politics out of the mix on any of these issues. There's political resistance to oil, to drilling off the coast of Florida or off the East Coast of the United States. There is just political resistance to those things. Energy touches everybody, and anything that touches everybody touches politics.

PANELIST: Just to wrap up, I think that in the long term, broadening the portfolio of energy choices we have makes sense, and that means working in a sustained way on maintaining the current energy choices, making them environmentally viable over the long term, but then bringing in new choices as we go forward with advances in technology, social acceptance and ease of deliverability.

The economics will follow as you get to scale, but I think broadening the choices we have, given the increasing needs of energy in the world just makes a lot of sense. But it's very hard work and very tough. No easy answers immediately.

DR. MEDLOCK: With that, I'll leave you with one final note. We're thinking about investments in the future, thinking about securing our future, not only economically but our energy future, because it's vital for that security. One of the lessons we all learned in Investment 101 is that a diversified portfolio is the best way forward. So diversification is key and I think each one of the speakers today has really hit on that point.

ENERGY AND U.S. FOREIGN POLICY

AMBASSADOR EDWARD DJEREJIAN, STEVE YOUNG,
AND STEVEN W. LEWIS

AMBASSADOR DJEREJIAN: Good afternoon ladies and gentlemen. I'm Ed Djerejian, I'm the founding director of the Baker Institute, and thanks to Isabel Wilson I am a new member of the Texas Philosophical Society. I'm very happy to be here with you.

My official title is Founding Director of the Baker Institute, but our illustrious honorary chair who you heard this morning, sometimes refers to me as the "Foundering Director" of the Baker Institute, so after my remarks I'll leave that judgment up to you.

I think we've had a terrific program. My excellent staff at the Baker Institute, the Energy Forum, Amy Jaffe and all her colleagues, and Steve Lewis and others you probably haven't seen, are really doing a terrific job in terms of making the Baker Institute's Energy Forum recognized as the best geopolitical energy studies program of any public policy institute in our country. I'm very grateful for their work.

What we're going to do this afternoon – and I'll introduce my other panelists sequentially after I conclude remarks – is to discuss energy and United States Foreign Policy. Steve Young will do "Oil and Terrorism" and then Steve Lewis will do "Competition for Energy Supplies and Growth in Asia," a very key factor.

Before I get started, I really want to recognize Senator Bill Bradley for being with us today. He is a great American and a great basketball star; we miss him in Washington.

Allow me to give you a broad overview of the basic situation in the very troubled Middle East and South Asia, and then make a few remarks connecting it to the energy issues that we've been discussing. After each one of our panelists have spoken, we'll open it up to a discussion with you, which I think will be very useful, to know what's on your mind, and try to answer your questions.

Well, it comes as no surprise to any of you that I've been involved in Middle East issues for many years. I was telling the Senator that our daughter graduated from Yale a couple of years ago and she asked me in one of those rare father-daughter conversations, "Dad, how long have you been involved in Middle Eastern affairs?" I said, "Well, sweetheart, over

32 years." And she paused, and looked at me and said, "You know, Dad, you really haven't done a good job." It is true we haven't done that good a job, but we've had some successes.

Let me do a broad brush survey of the situation. The region as you can see on this map is extremely troubled. Looking at the Levant, which is really Lebanon, Israel, Syria, Palestine and Jordan, you know that the conflicts in and between those countries are still very vivid and ongoing.

Lebanon is in an extremely fragile state. As of today they still have not been able to come to consensus on who the new president of Lebanon should be. That is a very critical issue because if the president of Lebanon is not a consensus candidate who really can bring together the Muslims and the Christians and the Druze and the political factions in that very complex, multi-confessional society, we may see another civil war in Lebanon, which at a time with all of the other problems we have, would be an absolutely destabilizing factor.

The Lebanese situation was exacerbated last summer, you'll remember, by the Israeli-Hezbollah war, which played out mostly in Lebanon. Hezbollah, which is the Shiite militia terrorist group in southern Lebanon, initiated some provocative acts and brought forth a very strong Israeli military reaction, which led to a war that was more protracted than anticipated. It ended badly for both sides. It ended badly for Israel because thousands and thousands of Israelis were displaced from northern Israel. When I was ambassador to Israel, I was often told by our Israeli friends that, "we have to live with terrorism, but we can live with terrorism because it's a lethal threat, it's not an existential threat." But when you think about what happened last year, with all of this population dislocation, it's getting more and more difficult for Israelis to live with this violence.

Sheik Hassan Nasrallah, the very powerful leader of Hezbollah, has made quite a name for himself in the Muslim world because he has been preaching resistance, and not negotiations, with Israel. He told Yasser Arafat when Arafat was going to Camp David, "You're going down the wrong path. Look what we did. We resisted the Israelis in southern Lebanon, they invaded our country in 1982, and in 2000 they had to withdraw and withdraw unilaterally. Resistance is the path, Chairman Arafat, not negotiations. Don't go to Washington, don't go to Camp David. Don't negotiate. The path is the path of resistance."

Now, this oratory has caught quite a bit of fire in the Arab, and in a larger sense, the Muslim world. To the extent that efforts at making peace flag or fail, the advocates of resistance and violence and terrorism have a much better chance of prevailing. So the stakes are very, very high.

In any case, Lebanon is a flashpoint. There have been at least six political assassinations in that country in the last few years, including the very critical one in which the Lebanese prime minister, Rafik Hariri Kariri was assassinated in February 2005. So the situation there is troubled.

Then you look at the Israeli-Palestinian equation right next door, and

we have seen elections in the Palestinian territories, and lo and behold, Hamas wins those elections. You talk about the principle of unintended consequences. The Administration has been promoting democracy, but let me leave you with one thought: we as Americans know too well that democracy is not just about elections. Elections are just one instrument of democracy. Democracy is the rule of law, the rights of minorities, the very important concept of the alternation of power. In other words, when you win an election and the votes go against you the next time, you leave, peacefully.

That is not a concept that is ingrained and embedded in the Middle East. You come to power; you hold onto it, by hook or crook. But Hamas' electoral victory was really a setback because it divided the Palestinians. Now you have the president of the Palestinian authority, and you have the Palestinian leader, Mahmud Abbas, in the West Bank, in Ramallah, representing the legitimate government; but at the same time you have the Hamas leadership mostly holed up in Gaza, who represent a very important constituency of the Palestinian people.

So eventually the Palestinians are going to have to reconcile between themselves, especially if current efforts toward Arab-Israeli peacemaking move forward. We are not going to be able to just bring one part of the Palestinian community forward to make peace with Israel. There's going to have to be some internal reconciliation.

Now, the good news on the Israeli-Palestinian front is the Administration has finally, late in its two mandates, engaged itself and brought the parties together in Annapolis as you saw just a few weeks ago. The Secretary of State, Condoleezza Rice, and the President are now leading the effort of the international community to get the Israelis and Palestinians to do two things: one, to improve the arrangements on the ground in terms of security, on the side of the Palestinians. They must get a grip on the security situation so they can stem violence and acts of terrorism, and build up their security apparatus so that they become a viable state that establish the rule of law and order in the Palestinian state. On the part of the Israelis, they really have to dismantle these outlawed settlements, outposts, and freeze settlement activity, and make other confidence-building measures that will show that they are intent on a final settlement.

Those are tough nuts to crack on both sides, but that's the first part of what Annapolis means. The second part of what Annapolis means is, negotiating the final status issues. And when I list them, you'll see how important, how terribly important, they are, but also how difficult they are: Jerusalem, the right of return and a just settlement to Palestinian refugees; the border, where will the Israeli settlements go; security measures; access to water. Now, as daunting as those final status issues sound, years of negotiation have narrowed these issues to a point where the general contours of a final settlement are pretty well known. The difficulty is actually getting there and negotiating the details.

We have a Baker Institute fellow this year, Sari Nusseibeh. He's our

Arab fellow. We also have an Israeli who is the Rabin fellow. Nusseibeh comes from one of the oldest Palestinian families in Jerusalem. He's the president of Al-Quds University and he produced a very interesting report that you can find on our website on how to negotiate Jerusalem and the right of return in tandem and that compromises on both can bring the Israelis and the Palestinians together. We have given that study to the State Department; we think that there's something there.

Also at the Baker Institute, I'm chairing an Israeli-Palestinian workshop comprised of Israeli and Palestinian teams that are looking at the territorial and settlements issues. We're doing computational models of the settlements, and how they are categorized by both sides in terms of religious importance, political importance, security, economic, etc. We're going to be giving the negotiators in the early part of next year a consensus, hopefully, a consensus of Israeli-Palestinian analysis of the settlement issue, which is one of the final settlement issues. You can see that we are actively engaged at this Institute on these issues.

The other big unresolved issue is Syria and Israel. Kissinger always said, "There cannot be war, an Arab-Israeli war, without Egypt; there cannot be a comprehensive Arab-Israeli peace without Syria." And there's a lot of truth to that.

Israel occupied the Golan Heights, strategic piece of territory in 1967. The big game there is the exchange of land for peace. There have been many, many hours of negotiation between Israel and Syria. We have been very actively involved as the United States. Secretary of State Baker and I, when I was ambassador to Damascus, helped to bring the parties into direct negotiations and the issues between them have been narrowed a great deal.

He called those negotiations in Damascus "bladder diplomacy," because when we negotiated for endless hours with the then-former president of Syria, Hafez Al-Assad, who would never, never get out of his chair. I warned Secretary Baker at one point. I said, "They're going to serve you sweet, hot tea and lemonade. Don't drink too much of it, because the call of nature will come, and he's not going to get up." And he turned to me and he said, "I am the Secretary of State of the most powerful country in the world. If he doesn't get up, I'm not going to get up." That was a real Texas attitude.

Unfortunately, I didn't follow the advice I gave him, and at one meeting that lasted six hours and 45 minutes, I made believe I had to make a telephone call to my embassy. Of course, my purpose was otherwise, and Secretary Baker saw right through it, and while I left the room he told the president of Syria, "You know, my ambassador can't hold his water."

So that was really bladder diplomacy. It was endless, but we did narrow the issues, and actually, we had a U.S.-Syria dialog here at the Baker Institute a couple of years ago. It is an accepted fact that at least 80 percent of the issues land on either the return of the Golan border, the nature of peace and normalized relations between Israel and Syria, security arrange-

ments (with a multinational force on the Golan Heights with an American military contingent if the parties request), and access to water. All of these issues have been discussed in quite some detail.

What is missing is the political courage and a political will of our leaders to bring this home. And it takes a lot of political courage to bring home Arab-Israeli peace. But that is one of the reasons we elect political leaders: to make the hard decisions for peace. And this is what, unfortunately, being candid with you, we have not seen. That political will and that courage to really lean on both sides, not pressure, but to create the diplomatic scenario that only the United States can, to bring the parties together. But this quest for peace can be brought home. If there's any hopeful message I want to leave with you, despite all of the difficulties and the mayhem we see in the Middle East, these issues can be resolved. A lot of work has been done.

Lebanon, if there's progress on these other tracks, Lebanon is easy. There are no territorial issues between Israel and Lebanon. There is Shaaba Farms, which is a myth. I won't bore you with the details on that. But Lebanon would come to a peace agreement in a wink with Israel, if Syria and Israel move forward and the Palestinians also. So there is some hope there.

Now, moving east in this troubled region to Iraq. I don't have to talk too much about Iraq because we all know about Iraq. But Iraq is in a very troubled state, despite the recent successes that we've had with General Petraeus and Ambassador Ryan Crocker. The Baker Institute was one of the organizational groups behind the Iraq Study Group, which Secretary Baker co-chaired with Lee Hamilton and I was a senior advisor, and they addressed the issue in a comprehensive manner.

We were very clear that three things had to happen. One, we had to change the mission of our U.S. combat forces to a very robust combat-embedded train and equip program to reorganize the Iraqi armed forces. One of the biggest mistakes the Administration made was to dismantle the Iraqi Army after the invasion of Iraq. I think that will go down as one of the biggest blunders in American foreign policy history. We did a joint Baker Institute - Council on Foreign Relations report in January 2003, two months before we went to war in Iraq, recommending that they "Do not dismantle the Iraqi armed forces. Do not fully de-Baathitize the civil service, because these are your technocrats. Get rid of all of the goons on the top, who have blood on their hands, who are close to Saddam Hussein. But don't send those soldiers home with guns and no salaries." Which we unfortunately did.

Another recommendation was "Do not go and purge the civil service of all Baathists." When I was ambassador to Syria I worked in another Araba-Baathist party country. It's like Tammany Hall. Most people joined the Bath party because you get a good job, your kids go to good schools and you get certain favors in the society. It's politics; it's largely local politics. But if you base your policy on an ideological outlook, you're going

to make some really serious foreign policy blunders. And those were two that we made. And we've been reeling from that ever since in Iraq.

The Sunni insurgency largely came from the former Iraqi soldiers. The Shiites joined the Shi'ite militias. But a lot of the Sunni insurgency came from the ranks of the Iraqi army and you know, they had the keys to all of the arms depots? They knew where the weapons were.

So ever since that time, we have had to try to make the best of a very bad situation in Iraq. When the Iraq Study Group was actually organized, in our inner councils we felt that we had been brought together two years too late. We had to make our recommendations based on the situation on the ground. One, reorganize the Iraqi armed forces, not as a sectarian military unit, organization but as a truly national army. Train and equip them; get them out to do the work of protecting the Iraqi people. Two, national reconciliation. Governance, which means basic services, electricity, water, picking up the trash, will show the people that there's a government that they can have an allegiance to. Allow them to have ordinary lives. Three, security, obviously. The other aspect of our report that was very important was what we called the new diplomatic offensive. The new diplomatic offensive basically meant that the first thing we should do is create a permanent Iraqi support group with all of the countries around Iraq: Iran, Syria, Turkey, Saudi Arabia, Jordan, and then a larger arc of countries including Egypt and others. So that everything we were trying to do inside of Iraq, establish security, national reconciliation, governance, could be supported by the neighbors.

We advocated in the new diplomatic offensive a very staunch dialog by the United States with Iran. You heard Secretary Baker this morning. Diplomacy is about negotiating peace with your enemies, not with your friends. Talk is not surrender; talk is not appeasement, unless we are totally stupid about it, and we give up all of our cards we have. I don't think we're stupid. But we should open up a strategic dialog with Iran; we should open up a strategic dialog with Syria too, those are two of the major countries around Iraq.

Now, you may ask, "Well, why in God's name should they help us?" It's not a charitable question; it's a question of their own national interests. Syria is a multi-confessional society of Muslims, Druze, Christians. It used to have a very important Jewish community, as did Iraq. Iran is a multi-confessional society. Only 52 percent of Iran's population is Persian. Almost one quarter, 24 percent of Iran's population are Azeri Turks. Nine percent are Kurds. There is an Arab population; et cetera. That is to say that if Iraq's multi-confessional society splits asunder, and you have an independent Kurdish state in the north, and a Shi'ite entity in the south, and something mixed in the middle with some sort of Sunni entity in the middle, it would be very messy.

That could start destabilization in the region as a whole. Because the Kurds would be encouraged to establish their own state, which would pose a very imminent threat to Turkey's national security and territorial

integrity; to Syria's, which also has a large Kurdish population; and to Iran. So the idea of partitioning Iraq is a worst-case scenario. Senator Biden and Les Gelb, proposed the Biden-Gelb plan as a confederal system. They don't use the word, confederal. First it was, partition; then they went to federation. But that's what may happen if things really go bad. That would be a very destabilizing situation in the whole Middle East, and in a very important part of the Middle East and in the Gulf as I mentioned.

In terms of Iraq, I do think we have a chance. All of the options are not good; they're bad options. But I think we do still have a chance of stabilizing the country, and prevent it from going asunder. But we are going to have to really be there for a while longer, and don't ask me what that means, but we had a group of Sunni tribal chiefs from Al-Anbar province visit me at the Baker Institute. That province is the Sunni province in the west of Iraq, and they basically told me, "Don't leave before you leave behind an Iraqi armed force that is not purely sectarian and full of Shiites; once you leave, they'll come for us. We'll go for them, and there will be a major civil war in this country."

I think we have to leave Iraq with a semblance of some chance that the country will hang together, and that's the daunting challenge we have. And whoever becomes President in January 2009 is going to be facing this problem. And then you'll see the difference between the campaign rhetoric and when they're faced with the facts on the ground, and what decisions they're going to make.

Going further east in this wonderful resort area is Iran. Now, it's amazing Americans have learned to pronounce the name of the president of Iran, Ahmadinejad. The guy's really has a very successful PR campaign. But he doesn't represent the real power in Iran. He makes a lot of noise. I'm not saying he's unimportant. But the real power is in the hands of the Ayatollahs, the clerics, and especially Ayatollah Khomeini.

Iran is a major regional power in the Middle East and in the Gulf. It cannot be ignored. It has a very rich history, going back thousands of years. The Iranians don't see themselves as bit players in the Middle East. They want to play their role. Now, defining that role is the challenge. They have been very bad actors. They have opposed Arab-Israeli peace. They have supported Hezbollah and Hamas and terrorist groups. They are in staunch opposition to our policies; they have been aiding and abetting the Shiite militia in Iraq.

But on the other hand, we've also had moments of real collaboration with them on Afghanistan, right after 9/11 when we went, rightfully so, militarily into Afghanistan, the Iranians collaborated with us very closely. The Taliban was also their enemy, and so there are instances of cooperation and collaboration with the Iranians.

This latest national intelligence estimate has really caused quite a bit of sensation about the nuclear issues. The important thing is that the Iranians did have a covert nuclear weapons program. They stopped it in 2003. They stopped it when we invaded Iraq. They stopped it because there

were stricter international sanctions being imposed on them, and they also stopped it because they just felt that they could not predict what we were going to be doing next. But the good news is that they stopped it in 2003. The bad news is that they can regenerate that secret program at any time of their choosing.

But there's a moment of opportunity now. The program has stopped. We should engage with them, just like Secretary Baker said this morning, like Ronald Reagan did with the Soviet Union. You can both contain and engage a country at the same time. My own view is that the only way we're going to have a real chance of a settlement with Iran on the nuclear issue, is if we engage in a strategic dialog with them. If we take that off the table, our policy is regime change. No country is going to negotiate with us on a critical issue like the nuclear issue if our policy is regime change. Why in God's name should anyone negotiate with us if your policy, either stated or covert, is regime change? It doesn't make sense. Just doesn't make sense. Again, you negotiate peace with your enemies, not with your friends.

So going further east, is the incredibly important area of South Asia and Pakistan, Kashmir and India, and Afghanistan. This is a little arc of crisis; India and Pakistan are nuclear weapon states. They have a very serious dispute in Kashmir. Both sides claim it as its territory. And they have fought in three wars already with one another. And that is a serious crisis issue. I hope whoever becomes president in January 2009 will not neglect South Asia as almost every administration has, unless there's a crisis that erupts there. And then of course Afghanistan is slipping backwards. The Taliban are back, and we have to really re-engage there.

Now, what does this all have to do with oil? There's the political risk factor in the price of oil. Amy Jaffe and I talked about this. I cannot put a dollar sign on how much more dollars a barrel of oil costs because of what I just explained is happening in the region. But this is the world's largest area producing oil and gas. Forty percent of the world's oil comes through that Gulf. The Arabs call it the Arab Gulf; the Persians call it the Persian Gulf. And it goes through the Straits of Hormuz. Saudi Arabia is the largest single producer of excess capacity in the world.

The geopolitics of this region affect energy security and the price of energy in a major way. Any major disruption will send the price of oil higher than we've even seen recently. There could also be supply disruptions, which can cause havoc. Steve will be talking about Asia's increasing energy demands as we speak, especially China and India.

So there is a geopolitical price factored into the price of energy. Any prudent policy by our country and our Presidents should have this as one of the highest priorities, not just for oil, but for peace and stability, to really try to limit the forces of extremism in the Muslim world, that exploit all these issues for their own ends, but also to help stabilize the energy equation. Thank you very much.

It's now my pleasure to introduce Steve Young, who's a professor at

the College of Criminal Justice in Sam Houston. I know Steve; he is an expert on counter-terrorism. He's served in the U.S. Department of State's counter-terrorism division, and he's been posted in the region, in Europe, the Middle East and South Asia. Join me in welcoming Steve Young to the podium.

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STEVE YOUNG

Good afternoon. I have a little film clip I want to play that might wake you up a bit, if we can work this thing right. Sometimes the bad guys don't win. That was a homemade mortar out of Iraq. In case you don't know, you can download these things; they're all over the Internet. Terrorist websites are ubiquitous all over the Internet. In this particular clip, the guy was putting together a homemade mortar and it blew up on him. So that's one for us.

This afternoon I'd like to spend a few minutes talking about the issues of oil and terror. When considering this subject or subjects, one can think of these topics in several different aspects depending on your perspective. Osama bin Laden views oil as a commodity, believing that the United States and the West have long stolen oil wells. According to bin Laden, and I quote, "You steal our wealth and oil at paltry prices, because of your international influence and military threats. This theft is indeed the biggest theft ever witnessed by mankind in the history of the world."

Oil can also be a physical, and by extension, economic, target. Oil pipelines, for example, are vulnerable to sabotage by terrorists, thus exposing citizens to the psychological stress of perceived vulnerability, exacerbating an all-too-common supply situation these days.

According to the FBI, plans exist for Al Qaeda to continue attacks against the global petroleum sector. Al Qaeda plans to weaken the petroleum industry by conducting additional sea-based attacks against large oil tankers. Such attacks may be part of more extensive operations against port facilities and other energy-related targets, including oil facilities and nuclear power plants.

Currently, in Iraq we've seen many instances of sabotage of Iraq's oil infrastructure, particularly up around Kirkut, where the northern oil fields are located. The potential for these attacks are also true anywhere in the United States you find oil pipelines. Prudhoe Bay, for example, extremely exposed pipeline, and also he numerous oil and gas pipelines that stretch like spider webs originating here in Houston, and also in the Midland-Odessa area.

A couple of other examples of oil being a target: February 2006 an attack through suicide bombers in Saudi Arabia on the largest oil refinery there, before they were stopped by Saudi security officers. And in October 2002, the French-flagged oil tanker *Lindbergh* was attacked by an

explosives-laden dinghy in a manner very similar to the October 2000 attack on the *U.S.S. Cole*. The result was \$45 million damage to the ship, and 90,000 barrels of oil leaking into the Gulf of Aden.

So besides being an economic target, we've come to realize that oil is a finite and, currently, a necessary resource. I think that was brought home very, very well in this morning's programs. This has resulted in high oil prices per barrel, reflected not only in high gas prices but in all phases of the U.S. consumer-based economy. For example, increased oil prices will impact the average consumer's budget in terms of the family grocery bill, as transportation costs increase. And a list of petroleum-based products such as plastics is extremely long, and increased oil prices are going to affect those also.

Therefore, as a country we are highly dependent on oil-producing nations to provide the energy and resources for our basic economic existence. If it were not for oil production and importation, our economy would simply grind to a halt. So this afternoon I plan to address another aspect of oil and terror, which I call enablers of terror based on an oil economy.

But first, let me tell you about the primary oil producers and consumers. According to 2006 data, of course Saudi Arabia is the largest oil producer in the world, at approximately 10 million barrels a day. But what's also interesting about Saudi Arabia is that it also constitutes 87 percent of its export income. Russia produces about nine million barrels a day, and Iran, four million barrels a day; United States, eight million barrels a day. By comparison, U.S. consumes approximately 20 million barrels a day. And we all heard about how China is going to start increasing its consumption. It currently only consumes seven million barrels a day and this is expected to increase fourfold by 2030. Japan, also, by comparison, consumption is at five million barrels a day, and India, at two and a half million barrels a day.

So where do we get our oil? Primarily, thank goodness, from Canada and then from Saudi Arabia, Mexico, then Nigeria and Venezuela. So from these data, as the U.S. continues to maintain its current reliance on oil, in order to maintain our current standard of living, we must import more than 12 million barrels a day.

Let's do the math. Fortunately, that's spread out amongst a number of countries, none more than about 10 percent of our current imports. Saudi Arabia almost totally relies on oil for its export income, and the U.S. imports a substantial portion of its oil from relatively unstable countries such as Saudi Arabia, Venezuela and Nigeria.

Because Saudi Arabia is the leading oil producer, and we're the world's foremost consumer, let's look at our relationship with Saudi Arabia for a few minutes. Since 1945, a succession of U.S. presidents has pledged to defend the royal Saudi family, so long as they kept the oil flowing to U.S. markets. Evidence of the effects of a shortage in the oil supply came first in 1973, and I know we can all relate to that shortage, when OPEC cut

supply in response to our support of Israel during the Yom Kippur War.

The point is that, even as early as 1973, when oil was less than \$4 a barrel, the West was shown to be dependent and vulnerable to reliable oil flow from the Middle East and OPEC. I myself in 1973 was a young Marine pilot, and a lot of our training missions were curtailed or eliminated, simply because of this oil glut, or oil curtailment by OPEC.

Regarding efforts to keep the oil flowing, the first Gulf War was perceived by many in the Middle East and elsewhere that the war was an effort by the United States to maintain a sufficient oil flow from the Middle East, not so much as an effort to free Kuwait. The same could be said for the current incursion into Iraq. Nevertheless, during the first Gulf War, we had over a half a million U.S. troops, and almost as many in the coalition, putting approximately one million troops into the Kingdom of Saudi Arabia. Now this is a country where there are no tourists; you can't get a tourist visa to go to Saudi Arabia, and only Muslims are allowed to visit Mecca and Medina. The number of infidel troops in the Kingdom was unacceptable to religious conservatives such as Osama bin Laden.

Ironically, it was about this time that bin Laden had returned from Africa. If you recall your history, the Afghan War lasted from '79 to '89, and the first Gulf War started shortly thereafter. Bin Laden had at that time at his disposal a number of fighters, very battled-hardened mujahideen that he could have called on to help drive Saddam Hussein out of Kuwait. And in fact, he did make this offer to the King of Saudi Arabia. The offer was obviously rejected in favor of U.S. troops, and this simply outraged bin Laden, and was the cause for some of his animosity towards the West today.

Looking at the top five oil-producing countries, we find that number one is Saudi Arabia and Iran is number four. We also take a look at those countries, and find that economic and political diversity is low, job creation is low, and the wealth gap between rich and poor is great. In both these countries, the wealth created by the oil windfall does not trickle down, and there is little evidence of a thriving middle class.

So how then does that oil-related income relate to terrorism? Well, both of these states have become fertile recruiting grounds. Moreover, the premise here is that oil-based or single-source economies can become terror enablers. First, take the case of Saudi Arabia. In the Muslim world, the tradition is to provide money for Islamic charities in the form of tithing, known as *Zakat*. This amounts to approximately two and a half percent of a family's income, which in Saudi Arabia can be substantial.

Of course, there are many Islamic charities in the world doing very good work. But there are some that have been listed by the United States Office of Foreign Assets Control as having ties to or providing support for terrorist organizations. Money is simply skimmed off from a charity's assets and provided to various terrorist organizations, and that particular chapter's host country. Prominent among those charities with headquarters in Saudi Arabia is the Al-Haramain Foundation. Throughout the

world, Al-Haramain was known as the builder of mosques and schools, primarily to promote though, the Saudi form of Islam, called Wahhabiism. It is also a worldwide charity whose assets in the United State were frozen in 2004 as a result of investigations of its connections to Al Qaeda. Many other Al-Haramain chapters in various countries from the Balkans to the Far East, have been shut down.

Another example is the International Islamic Relief Organization. This organization is headed by Saudi government officials and Jeddah, and their function is to build mosques and schools, or madrassas. Unfortunately, a lot of these madrassas espouse anti-Western theology. The United States and the United Nations in 2006 designated the Philippines and the Indonesian branches of the Islamic Relief Organization as financiers of terrorism. The Philippine branch also was once headed by Mohammed Jamal Khalifa, who is bin Laden's brother-in-law. Numerous reports have stated that individual Saudi citizens, through Zachat contributions, donated through charities helped fund Sunni insurgents in the current war in Iraq. This is not only used to fight against U.S. troops but also to provide a counterweight to the support that the Iranians are providing to the Shia community in Iraq.

So as the madrassas are funded, either individually by Saudi donors, or by Islamic charities, they are inevitably staffed by Imams preaching Wahhabiism. So what about Wahhabiism makes it different than other forms of Islam? Well, it's named after its founder, Mohammed Abdul Wahab, an Islamic reformer who lived in the 1700s. So it's a very, very old sect or set of beliefs. At that time, a local tribal chieftain, Mohammed Ibn Saud converted to Wahab's strict brand of Islam creating a political religious entity that was passed down through Sauod's bloodline. The founding of the modern Kingdom of Saudi Arabia was accomplished in 1932, and at that time, Wahhabiism was brought into the forefront as being the official, strict brand of Islam for the country.

So what is it about Wahhabiism that makes it different? Wahhabiism describes non-Muslims and Shias as infidels. Also, the modern concept of jihad as religious war and that paradise is promised to fallen jihadists. This strict brand of Sunni Islam has also been embraced by the Taliban in Afghanistan as being very influential in the development of their strict ideology.

Especially in Pakistan, these madrassas have been fertile recruiting grounds for any number of terrorist organizations. Therefore, in Saudi Arabia we have a country dependent on its oil for national export income also being the world's largest oil producer, involved in supporting the spread of a very strict and relatively intolerant form of Islam.

Now, let's take a look at Iran just for a few minutes. Iran, as the Ambassador has already described, predominantly a Shia nation, is in contrast to Saudi Arabia, which is predominantly of the Sunni sect. Also, it's predominantly Persian, not Arab, with a very long cultural history and a very proud people, exporters of fine carpets and pistachio nuts. It's also the world's second-largest OPEC producer. Although Iran's economy is more

diversified than Saudi Arabia's, without oil assets and the current revenue windfall, the regime would likely have been destabilized years ago. Iran has also been on the State Department's list of state sponsors of terror since 1984.

So where does this oil money go, in relation to terror? Iran has largely been responsible for providing arms and weapons in roadside bombing technology; IEDs, we've seen over the last three years, have increased on lethality and killing power, primarily through the development of technology provided by Iran. Iran has been involved in training insurgents and sending them over to Iraq to fight against the Americans. They also have political party representation in the Iraqi parliament. They are strong supporters of two parliamentary majority parties in Iraq right now.

They are also, famously or infamously, supporting terror all over the world in the form of founding and the constant funding of Hezbollah, as the Ambassador has referred to earlier. It was founded in 1982 by the Iranian Revolutionary Guard Corps in response to the Israeli invasion of Lebanon, in order to eliminate the Palestinian Liberation Organization. In the 1980s, Hezbollah was responsible for some of the deadliest attacks against the West and the United States, for example, the 1983 suicide truck bombing that killed 241 Marines and 58 paratroopers of the French in Beirut. The 1985 hijacking of TWA 847; I remember vividly seeing on the television the Hezbollah terrorist poking his head out of the window of TWA 847 with the pistol up against the temple of the captain of the aircraft. I believe his name is Testrake and he lives in Missouri still today.

The 1992 bombing of the Israeli embassy in Buenos Aires, and also the 1993 bombing of the Israeli Cultural Center in Buenos Aires are just some other examples of Hezbollah attacks. Also the consistent rocket attacks on the northern border from Israel into Lebanon, over the years, has just created havoc in northern Israel and the July 2006 border raid that captured two Israeli soldiers resulted in the latest 30-day war between Israel and Hezbollah. Sophisticated arms were used by Hezbollah for the first time. And also for the first time, an Israeli gunboat was sunk by Hezbollah arms, more than likely provided by Iran. More recently, Iran has begun providing financial support to Hamas. Now presently controlling the political landscape in the Gaza Strip, and responsible for numerous daily rocket attacks into Israel, the situation with Iran's nuclear ambitions are already well documented and I'm not going to go into those today.

In Iran therefore we have predominantly a Shia country, with the potential for acquiring nuclear weapons, providing material and financial support to two of the Middle East's more prominent terror organizations, Hamas and Hezbollah, both of which are dedicated to Israel's destruction. The question then is, how supportive of this mischief would Iran be capable of, without its oil income? So for comparison purposes, let's take a quick look at some Muslim countries that are also top oil producers and see what they do with their oil money.

Although oil may dominate the economies of the UAE and Dubai, they are not exporters of terror. Dubai is home to the world's only seven-star

hotel, and it is a regional service and merchandising business center. Take Libya for another example, they just removed from the U.S. list of state sponsors of terror in 2006, following payment of reparations to families of the Pan Am 103 bombing, the Lockerbie incident, you might know that one. After extensive negotiations, now even Libya is opening itself up to U.S. investments in its large oil industry. It has renounced its nuclear ambitions and is trying to rebuild its infrastructure via its oil money.

You take a look at some other Middle Eastern countries that don't have an oil-based economy, like Lebanon. This is an unfortunate situation. It's a country caught between Syria and Israel that has no oil; and was once known as the Paris of the Middle East, with outdoor cafés, modern shopping and a very diverse culture. It's unfortunate that this country is host also to Hezbollah, and up until a couple of years ago, 40,000 Syrian troops.

Jordan has a free trade agreement with the United States, and began deregulating its economy and upgrading its education system in 1989, after Arab states cut its oil subsidies. Egypt's economy is based on agriculture, textiles, tourism. Being only one of two Arab states to sign a peace treaty with Israel, it remains a very strong political force in the area.

Bahrain has allowed women to run for political office, it's working on labor reforms, and has also signed a trade agreement with the United States. Turkey recently elected an Islamist government but it still adheres to its relatively secular policies.

The key therefore in these last few countries is that these economies could not rely on oil. Whether it's tourism and manufacturing, and agriculture or whatever, these economies are diversified. We heard talk this morning about diversification of oil supply. Well, the same thing applies to your economy. Trade agreements with the U.S. have stimulated their economies, providing for a strong middle class, a broadened education structure and other reforms that permit a stable society, still within the context of Islam.

So in conclusion, how do we approach the problem of radical Islam and its use of petrodollars? Well, one way is obviously by attacking the Islamic charities. The Office of Foreign Assets or is already accomplishing that by freezing assets. This is occurring all over the world. But as the Ambassador and other people have already mentioned, diplomatic, political and economic pressure is a necessary tool to encourage Saudi Arabia, Iran and other states to proceed with democratic and economic reforms.

What I'm talking about here is really a multipronged counter-terrorism strategy. We cannot win the global war on terror with guns alone. What's needed is an aggressive attack against the root causes of radical Islam. For example, the development of more open political systems, greater economic opportunities, and encouragement of Muslim reform figures that would appeal to a broad section of the Muslim populace.

Now, I realize I covered a lot of territory in this very short time. I would like to thank the Philosophical Society of Texas and the Baker Institute for

allowing me to make these points, and I'd be pleased to answer questions during the panel session. Thank you.

AMBASSADOR DJEREJIAN: It's now my pleasure to introduce Steve Lewis. Dr. Lewis is the Baker Institute's Fellow in Asian Studies, and Professor of the Practice of Humanities and Director of the Asian Studies Program at Rice University itself. Steve has been with us at the Baker Institute for many years, and he and some other faculty members here at Rice initiated his unique program on studying Chinese transnational culture, not only the mainland but in Taiwan and Hong Kong and Singapore and overseas Chinese communities. He is analyzing the emerging middle class in China through their consumer tastes and how they're going to impact on the democratization and the market capital development of China. So join me in welcoming Dr. Lewis.

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STEVE LEWIS

Thank you Ambassador and thank you to the Philosophical Society of Texas for this opportunity to come and meet with you, and to introduce you to Rice University and more specifically some of our research that we're doing here at the Baker Institute on energy policy, and as the Ambassador's mentioned, its ties to studies of the growing middle class in China and the Chinese diaspora and community around the world.

Part of my research is focused on cultural aspects in the way that Chinese media and Chinese films and literatures are circulating around the world, are becoming influential. China wants to become a cultural power in some way through its film industry and all of these. The other area that I look at, and drawing upon the work of my colleagues here at the Baker Institute, is looking at energy policy, and looking at Chinese energy companies in particular.

I thought I would tie in with what the Ambassador and Steve Young have been talking about by introducing a bit more of the research myself and my other colleagues here at the Baker Institute are working on; show you a little bit more about how China and the rest of Asia are playing more of a role in world energy markets. So I'll introduce some of the research that they have done, but also I'll come back to talk about some of the unique things that we are doing here, that look more at the role of these Chinese companies, as they're going overseas.

Let me ask a question that everybody is talking about now, "Is China becoming an energy rival to the United States?" I'm going to talk a little bit about China and India, because they're very much related as Asian powers in the sense that both of them are the future. The difference however, and that's why I'm going to focus mainly on China, is that India's

role is largely unseen at this point. It still has a lot more to grow, in comparison with China, and it's also true that we have a lot more public visibility of the Chinese energy companies. I don't wish to ignore India but really just to point out that China is a little bit farther ahead.

To answer this question of China becoming an energy rival of the United States, let me show you a little bit of economic analysis and some nice figures which I think show the structure of growth and increased demand for all of these fossil fuels from Asia, and then also what role the Chinese government and the national oil companies play in this as they go about trying to obtain these stable, secure supplies. I'll talk about some of the potential areas of conflict and cooperation, because the short answer I can give you right now is that, there are some key issues where China is a competitor; it is a rival.

Because they also are, in some areas in China, an advanced industrial society to some degree, who is dependent upon fossil fuels from other countries, they are also very much open to the global economy, much as we are. There is actually a lot of potential for cooperation too. I don't want to walk away with the impression that I'm saying that China is some type of enemy when it comes to energy issues.

What do most Americans and Chinese think about each other? Next week there will be a new poll released in Washington, D.C. done by Zogby and the Committee of One Hundred, of American and Chinese survey research groups asking the question: "What do you think of the United States as a rival?" "Do you think of China as a rival?" Most Americans and most Chinese do think of each other as being rivals. And one of the areas they think about it is energy. So this is clearly something on the minds of Americans and Chinese and we have to take this very seriously.

What I'd like to show you here is projections for Asian countries and the United States for demand, from 1985 all the way over to 2025. We can see that the United States is at the top there, followed by China, India, Japan and South Korea. What it shows as we move forward in the future, we can see just what a very large role that China, India, Japan and South Korea are going to play in comparison with the United States. On average, over this period, China will be growing about 4 percent per year in increased demand; the United States about 1.8 percent, as with most other advanced industrial societies. If we look at what's driving this, it's just the economies. Look at world GDP, and the regional shares in that. Who is producing what in the different parts of the world, starting off in 1975 and moving all the way across to 2030, we look at the red bars as being China, India, the rest of developing Asia. Then that big blue bar across the middle there, that shrinking part is the OECD countries, all the advanced industrial societies. And so what it really tells us is where manufacturing is going. That's why, of course, all of our clothes and our toys and everything is coming from China. This is showing the projections out through 2030.

You can see where the growth is going to be happening in Asia in particular. What's unique about China in contrast with some of the other

developing countries in the past is that so much of it is invested in industry. Look industry from 1970 to 2004; it's the very biggest part of their economic growth, their GDP. So you look at China, that red line at the top there, and you can see that over half of GDP comes from industry.

India you can see is growing, from 20 percent to about 30 percent by just 2004. But the OECD countries, following the purple line, show you what happens as countries begin to develop; more and more they move into services, and they move into these other industries.

But China's development path and also India's really is showing that industry is going to be the largest part of economic growth. Well, for industry you're going to need a lot of power, obviously. So if we look at the shares of China and India in the global coal, oil and power capacity growth, from over the next 25 years or so, China and India are going to represent much of the increased demand for coal; you can see about 80 percent in comparison to all these countries. Oil demand is still very significant. And power generation capacity as well; we will need more power and it's mainly going to be, again, for industry. Where does China get its fuel? The brown bars represent coal, and the very top one there is actually hydroelectric. But we're looking at 2004, 2015 and 2030.

And what this really shows us is that China is greatly increasing some of its renewable sources of energy, like hydro for example. And you can see even in 2030, the far right bar, it's a significant part. You may have heard about the Three Gorges Dam Project, this enormous dam project. Well, there are thousands and thousands of smaller dams spread throughout China's countryside; it's a very mountainous country. They're able to add a lot of these. So China is adding an awful lot there, but it's still going to require a lot more coal.

It's very much like the United States. Actually, about 70 percent of the fuel used in China, much like the United States, is coal. And they have huge coal supplies, just like we do, spread throughout the country. If we look at investment in the power sector up through the next 25 years comparing on the far left we have the other Asian countries and we have the European Union, the United States, China, India, other so-called transition economies, and Latin America. And the red sections represent the increase for demand, for power sector over the next 25 years. And those are in billions of dollars.

And what that says is that China is probably going to need about \$3 trillion to develop all of that, which suggests that it's not just going to need to develop more coal but also need the technology. So if you're wondering why your General Electric stock is still staying fairly high, it's because they're selling all of those turbines in China, and everybody is moving to China to sell their technology.

It also represents the fact that China will be out there competing for investment dollars as well. That's going to mean major changes for individual investors and also institutional investors when they start looking at power in China; by the way I don't have it up here as much but Russia

and the rest of East Asia will require them as well. There's going to be a lot more competition, to meet this demand for trillions of dollars of power capacity.

This is a nice chart, I think, which shows the United States and China in comparison on gasoline; what are we using our fuel for? The United States, the top graph, shows you from 1980 to 2005, millions of barrels per day. The United States has moved from just under 8 million in 1980 to currently more than 12 million barrels a day. Gasoline in China is the bottom graph there, and you can see that although it's much lower, it's rising very rapidly.

This shows us that one of the main drivers of that increased demand for oil is going to be cars. This actually shows vehicle ownership in 2004; the left side shows vehicles per 1,000 people and the bottom is GDP *per capita*. You can see the United States and Japan, off in the far upper right corner, the GDP *per capita* is around \$40,000, and we have 800 or 900 cars per 1,000 people. If you look at China, down there in the lower left hand corner, you can see their GDP *per capita* is around \$2,000, and ownership is about 20 cars per 1,000; much, much, much lower.

What this graph doesn't show you, however, and this is why all of the automakers are in China, is that there are parts of China which are actually way ahead. Beijing is 133 cars per 1,000; which explains why there are 4 million cars on the streets of Beijing. It's the same for Shanghai and some of these large cities. And you say, "Well, that's just two cities, two or three cities out of a population of 1.3 billion people, that doesn't sound like very much." But consider that Shanghai is 20 million people; Beijing is about 15 million people. That is the same population as a lot of countries, like Korea, Thailand, even Canada for that matter. It's very hard to include in these economic analyses, because it is just so large and parts of it are significant players.

So where are they getting this oil to feed all the demand for cars? About 7 million barrels a day is what the Chinese economy currently needs and they get about half of that from domestic production, and half of it comes from overseas. The domestic production comes from three state-owned oil companies. China is a little bit like Russia, but not like most developing countries in the sense that it has three separate national oil companies, and they actually compete with each other. CNPC, or PetroChina, as many people know it here, was the one that was all in upstream, producing the oil. Then Sinopec, the second largest one, was the one that was all in downstream. And then CNOOC, or "C-Noc," which we do know here, mainly because they're the ones who tried to buy Unocal in 2005, they are the ones who just do offshore.

But in 1998, the Chinese central government decided that the best way to manage China's economy was to force the two largest companies to switch; they made them vertically integrated companies. They said, "All right, you take this oilfield, you take this refinery, and we're going to switch you around, and try and maintain control. That created two very

large oil giants, CNPC-Sinopec and CNOOC. In this graph you can see that CNPC, from 2000 to 2005, produced about 2.2 million barrels of oil per day, Sinopec is a good bit smaller, only 783,000, CNOOC, the one that we know most in the United States, only about half a million barrels per day, from within China. In 2000 and 2005 they seem to be doing well; they're producing more, they've increased slightly, but the key point is that they're not keeping up with demand. That's why they have to import more and more.

Let me show you very quickly why Chinese policy makers and companies are so focused on going overseas, and in particular how they're doing it. You have to look at the individual companies, the different parts of these big oil giants. CNPC by the way has about 1.7 million employees. They're producing less than, Texaco and Exxon which have 30,000 to 40,000 employees. Sinopec has about 800,000 employees and CNOOC, that little one that tried to buy Unocal, only has about 40,000 employees. So they're more like an IOC, an independent oil company.

Historically these Chinese oil companies grew by developing very large fields. If you look at the top one there, Daqing, which most people in China know as the symbol of China's success; they always talk about it in agriculture studies, this commune call Da Jai, in industry study, Daqing. So it is China's most successful socialist enterprise. Daqing in 1998 produced 1.1 million barrels. In 2005 about 889,000. Lihua is the second-largest one there, which represents about 20 percent of China's production, Daqing about 60 percent of domestic production; they've both fallen off dramatically. There are all these smaller fields, which are mainly in Western China, and out in the desert regions, and some of the more exploratory areas. They've been increasing, but they're also very small and relatively insignificant.

The same thing is true for Sinopec, the second largest company. They inherited the second-largest oil field, Shengli, which is fairly close to Beijing, and they've also had a fall-off. What this tells us is that most of the domestic production in China is concentrated in a few very large oil fields, that are decreasing. They've passed their capacity and they're shrinking. So it's requiring a lot more investment.

By the way, the heads of these individual oil fields in China have a ranking within the Chinese Communist Party, at the ministerial level within the government and as a party ranking, even higher in some cases.

So what do you do? Well, you still have to bring the oil in; you still have to refine it and serve your customers, which is largely the government. You also have experts who are specializing in technology, and drilling and exploration. What do you do? You send them overseas. So what's happened over the last 10 or 15 years is that the individual parts of these large oil companies who have a lot of autonomy have been going overseas. They've gone to Africa, Venezuela, and Peru. I just read in the newspaper today, they're going to Costa Rica. The individual oil fields are directing them to go overseas. And the central and local governments in very

recent years have found ways to support that. China's so-called energy diplomacy over the last four or five years has been remarkably successful.

State government officials, usually in the Ministry of Foreign Affairs, support the Chinese national oil companies when they're going to Sudan or Nigeria or Angola, and offer them, special credits, special relationships; they work out package deals. The Chinese Ministry of Foreign Affairs has become much more, I would say, experienced and cohesive in working with the national oil companies over just the last three or four years.

Part of the goal of course is to create a more diverse supply because of the 3 million barrels a day that China is importing. About 40 percent of it comes from the Middle East, like the rest of Asia, Japan and Korea and these other countries, and that worries them because that means they're not only dependent upon the relationships in the Middle East that we've been talking about, but it means they are dependent upon the United States Navy for protection of the sea lanes. They worry most about a potential conflict over Taiwan, between the United States and China, and how that would disrupt the fuel supplies. The rest of East Asia is worried about that as well.

There are conflicting goals within the Chinese policy-making establishment. So the NOCs, the national oil companies, they're viewed as being instruments of foreign policy in China. The central government says, "Well, look. They're very successful, they're very large, and we need them anyway. Let's support them and use them for our foreign policy goals, our security goals." That said, because they are so incredibly resource-rich and oil in particular is something which is very much a cash revenue generator for the Chinese government, they're viewed as cash cows.

Our research is showing that as China begins to modernize, and as it's beginning to, it's closing old manufacturing enterprises. China's northeast in particular is one of those areas. That also happens to be where these large oil fields are, and they are also decreasing in production. What do you do, if you're a local government in that area and you're responsible for paying for all of these people who've been laid off? You've got to have some new source of revenue.

Well, China's problem is that unlike most countries, there are no royalties that go to local government. But local government is responsible for all of the costs of privatization and globalization. They have to pay for laid-off workers; they have to support them in some way. So there's a conflict between local government, national oil companies and central government.

The other big issue which has not been talked about, there really needs to be a lot more discussion of this publicly, is who is going to pay for the environmental cleanup from all of these very, very dirty, Chinese oil companies and potential disasters? You may have heard about a benzene leak in a city in northeast China, along one of the rivers that flows towards the border with Russia, this last year. They had to shut down the water supply for a city about the size of Houston and bringing in water. It was

all caused by a CNPC chemical factory upriver. It was interesting; there was no public discussion of this in China, about who was going to pay for this. In the end, it probably was the oil company that paid, but there was no public discussion because these national oil companies don't want to have any public discussion.

The central government is trying to force them now to buy environmental protection insurance to cover up the cost of potential disasters like this, but they are resisting. Now that's something that actually needs to be discussed. Why does the government think that these companies can pay for it? Well, actually CNPC on the books is the wealthiest company in the world. You may have heard that they went public on the Shanghai stock exchange last month. And according to that valuation, the total for CNPC is over \$1 trillion. You would imagine that if there is another benzene leak in some other part of China, a company with \$1 trillion dollars in so-called assets can afford to pay for it. It's going to be an issue, clearly, in the future.

Let me just finish by talking about some of the potential areas of competition and conflict between the United States and China. Clearly, there's going to be some conflict over specific oil and gas supplies. As the United States and China both try to diversify our energy supplies, there is potential for conflicts in places like Central Asia and Africa. There will also be conflict as it relates to regional security issues. Clearly the United States and China don't agree on relations with Russia, or in central Asia, definitely not in the Middle East.

I would also argue that the other real impact of China's national oil companies going overseas relates to what they have been taking from the Chinese investment banks and the export-import bank and the Chinese government. Coming up with these investment packets will not only help China's energy supply, but also builds really strong relations with those countries. As part of that, China is offering loans to governments in Africa that are much better terms than the World Bank can offer and a lot of the development banks and other governments can offer. We know there's just not as much transparency involved there.

The national oil companies play a role in that too, and it's also true that the Chinese national oil companies, even though they are somewhat owned by the public, and even by foreign investors to some degree, there's very little transparency. The contracts that they have in Sudan and these other countries, it's just not clear what is actually going on; what they're doing. It's a step backwards for corporate responsibility to have these Chinese national oil companies overseas playing such a very large role.

That said there are areas for potential cooperation and coordination. In the last few years, with the strategic economic dialogs, for example, between the United States and China and other countries, we see a lot more integration of energy policy. For example, next week in Beijing Secretary Paulson will be meeting with Chinese officials. What's happened over the last few years is that energy is being put on the table with trade,

military issues, security issues and with counter-terrorism issues. Because they're all being wrapped together, you've actually seen some movement forward on North Korea. The question is, will this model translate over to Iran or other Asian countries in central Asia?

It's also true that China has been joining more and more international organizations so they can start sharing data. Just this year, the International Energy Agency hosted a conference in Beijing with over 180 statisticians from different parts of China to try and come up with a way to get them to integrate just their data, so they can understand what's going on within China's localities. Once you start exchanging the data, you can start doing analysis and you can start questioning whether we're using the same models and projections and growth. So that's very encouraging.

Next will be to try and bring India into that as well. I would also like to say that one area that I think there's a lot of potential for cooperation and coordination, we just haven't seen it yet, is to look at collective demand management at the local level. Because as you know, when it comes to energy conservation, or efficiency or environmental issues, it's very local in the United States. Could be the state level, could be the city level. And it's the same for China as well. Chinese localities are competing against American localities and cities under this global economy.

As part of that, there might be some potential for adopting shared practices, in conservation. For example, if we're building new green buildings according to certain standards, or we're adopting new standards for appliances in energy consumption, or alternative fuel vehicles, if you have Chinese cities and American cities and Indian cities all using the same standards, this will lower the cost for corporations who want to try and build whatever vehicles or whatever services that do that. Right now, Chinese localities are all going in different directions, and the same thing with American localities. There's a lot of potential for coordination and development. But I think I would argue mainly at the local level.

The key point I wanted to show with our research is that China and the rest of Asia to some degree, are going to be very large players in energy and in oil in particular in the future and there's a lot of potential for cooperation and clearly there is going to be some competition.

AMBASSADOR DJEREJIAN: Ladies and gentlemen, the floor is yours.

Discussion:

AUDIENCE: I'm a little unusual in the sense that I've been in the industry since before I was born. My mother and father were both geologists, and now at 83, I feel like I know something about the industry.

My father made a trip back in 1937 to the Middle East, on behalf of the old Standard of New Jersey. I remember one of the things he said when he came back: "The British made a terrible mistake in setting up Iraq. Iraq was going to be an unstable country, because it had three different religious sects, all Muslim, but they should have done a better job than

they did. Jordan was successful; others were successful. That would have been the days when it was Mesopotamia, but it's going to be a failure."

AMBASSADOR DJEREJIAN: Ah, yes. If only we'd read our history; the British colonial period in the Middle East, and the French colonial period. People come up to me and ask, "What's the one book you recommend that I should read to understand the Middle East?" And they're sort of confused at first by my answer: "You really have to read David Fromkin's book, *A Peace to End All Peace*. It's a history of the French and British colonial division of the Middle East between 1916 and 1922. David Fromkin, I guess he still is a *New Yorker* writer. He did excellent research, and you may think it's obsolete to read a book that's about 15 years old. But if you read that book, it's well written, you go through the decisions that two men made, Mr. Sykes and Mr. Picot.

Mr. Sykes was the British agent in the Middle East, and Mr. Picot was the French agent. And they carved up the Middle East. That very survey I gave you earlier of the Middle East, it all goes back to that period. After World War I the British and the French consolidated their empires, and they drew these lines in the sand throughout the Middle East. You mentioned Iraq; the British actually drew the line in Iraq. They made one country out of what the Ottoman Empire had separated into multiple vilayets: the vilayet of Mosul, which was really the Kurdish areas; the vilayet of Baghdad, the vilayet of the Sunni and the vilayet of Basra, the Shiite areas.

They ruled those as large provinces by might. And the British went and they drew a line around all of that and brought it together, again in 1916-1922, but they did one little new thing. They cut off a little country called Kuwait from historic Iraq. And Saddam Hussein when he invaded Kuwait, appealed to Iraqi nationalism as Kuwait as the 19th Province of Iraq. So you could trace even Desert Storm to Sykes-Picot.

I mentioned Lebanon. The French wanted to build Lebanon as a Christian Arab state, so they carved greater Lebanon out of greater Syria, a largely Muslim state. And Syria has never considered Lebanon to be an independent state. To this day, there is not a Syrian embassy in Beirut and there is not a Lebanese embassy in Damascus.

So all that traces back to the British and the French, and especially the French, Palestine, creation of the State of Israel. They drew the lines; they created the Balfour Declaration, and the whole Israeli-Palestinian equation dates back—I mean, in contemporary terms dates back to that period. So what you're saying is absolutely true. By the way, it's very disheartening for me to say this; the British, when they left Iraq two years later had to go back in militarily. I hope we don't face a situation like that.

AUDIENCE: The United States and many, many other countries are in debt to China. How does that dynamic play into all this?

DR. LEWIS: I would say that it's really not clear just how much of our

debt or actually anybody's debt is owned by China, and Chinese companies and entities. The Chinese government-owned banks and some of the larger corporations, when they buy something overseas, including debt, it can be fairly clear to see. However, as I was talking about when it comes to the whole strategy of going overseas, you have just within these national oil companies, the headquarters might be going overseas to do things like buy some type of foreign debt; but all of the individual subsidiaries are as well. And they've set up offices in many countries around the world.

I suspect that we don't have anywhere near an accurate estimate of just how much is actually owned, and I'm sure the Chinese government doesn't either. So that's part of the issue; the Chinese central government won't tell you that they don't know. And certainly the national oil companies won't tell anybody that they don't know, because they themselves don't even know what the subsidiaries are actually doing.

One of the strategies that they've had, the reason they've had for going overseas, is to try and move assets offshore, such that the employees can then begin to privatize them. It's related to the corruption in the enterprises; they're trying to move it beyond the tax regime of the government in Beijing. So they make a lot of investments overseas and then they can take them and they can sell them in some way and it benefits the employees, in many cases, very directly. They've been doing this for years; setting up offices in as many countries as possible, that's a very easy way to do it.

We might say that X amount of American debt is owned by China, but we can see that, for example, there might be some African countries which seem to own a lot of American debt; that could actually be Chinese. I suspect we really just don't know, and that's one of the large issues.

AUDIENCE: Could you confirm whether or not the Chinese have imposed more rigid environmental standards for the automobiles than us?

DR. YOUNG: Well, it varies by locality. It's true the central government does want to impose emission standards which are, I think, generally stricter than they are in the United States. However, it really is only enforceable by the local governments in China, and I can assure you that very few governments in China, municipal governments, are taking any really concrete steps. Beijing, Shanghai, the larger cities are. Shanghai seems to have a very low amount of cars per 1,000 people, they have about 50 per 1,000; Beijing has 130 per 1,000.

So you think, "Well, why is that? Shanghai's the wealthiest; why do they have so few cars?" It's because the Shanghai government has been very successful at controlling transportation, and they've said, "No, we're setting a quota on the number of cars." And just this year, they set up a system where you have to bid online to get a driver's license and a plate. That's why Shanghai doesn't have this huge demand for cars, because the government is saying, no. What that shows us is that some parts of China are very effective at doing it.

But what about other parts of China? Leaded gasoline is still very

common in many of the cities in China in the interior. It's been banned in Beijing and in Shanghai, but safety standards are also quite different. I was recently in Xi'an in Western China, China's ancient capital; it's a major tourist destination. I'm sitting in a cab, and we're driving around. It's a tiny little cab, clearly a Chinese car, and I hear this sloshing noise behind me. And I look, and just behind the back seat, there's a large plastic tub of gasoline. That was the gas tank for the car, which was interesting, because our driver was smoking a cigarette. A simple collision from the rear, the gasoline would have spewed all over the cab, and hit the cigarette and it would be a nice little crematorium. And that was a major city. But in western China, and that was legal. It's changing but very slowly.

AUDIENCE: Claudia Stuart from Amarillo. How much of a player does Dubai want to be in all of this?

AMBASSADOR DJEREJIAN: First of all, as we know, Dubai is part of the United Arab Emirates, and the key oil and gas player is Abu Dhabi. That's where the oil wealth is in the Arab Emirates. And the control over the very important UAE oil and gas resources is out of Abu Dhabi.

Dubai has caught the headlines because it's just doing this incredible re-invention of a tiny pearl-diving city into this mega-polis of tourism and financial center and all sorts of things are going on there. There was a lot of news made when the head of Halliburton decided that he was moving to Dubai to set up his offices in Dubai. That caught everybody's eye. I think actually what happened is that Halliburton won't be leaving Houston, but the CEO's office is going, perhaps for a long period of time, and he'll spend any one given year in Dubai.

It has become a center for financial services; it's become a center for tourism; it's become a center for various companies that are relocating there, and using Dubai as a hub throughout the whole region, into Asia. But the real oil wealth is really in Abu Dhabi.

AUDIENCE: I wanted to respond to Steve Young's call for more diversification into Muslim countries. A significant problem is what in economics is called the resource curse. And what happens in the resource curse is that one country as a large part of its economy exports massive amounts of oil. And as a result, the exchange rate gets distorted. I'm not going to say it gets overvalued, but a lot of people would. And as a result, the number of dollars you have to pay for that currency goes up and up and up. As this occurs, other industries fall. They cannot export, because the currency is so distorted. You can also see the same thing in Venezuela, where 100 years ago, agriculture was the major source of Venezuelan exports to other countries. But as energy became more and more a part of the economy, agriculture just absolutely flopped as an export.

DR. YOUNG: No, I couldn't agree more. My point was about the fact that oil is so much a part of the export income and none of the income from

that is getting down to the people who really need it; a complete lack of the middle class in the Middle East. What makes the United States such a great country is the very strong and vibrant middle class. You don't find that when you go to the Middle East, in most cases, especially where you have an oil-dominated economy.

AMBASSADOR DJEREJIAN: I would just like to underscore what Steve Young is saying there. We didn't have time to really go into it, but if you look at Saudi Arabia, there's real poverty in Saudi Arabia. There is an educational system that doesn't function well, that does not produce entrance into the marketplace; they don't study the social sciences, engineering, natural sciences, business or economics. I have nothing against the study of religion, but there are many, many young people who study religion because it's an easy way to get a degree.

As Steve said, the middle class is burgeoning, but when the middle class looks up, they see 6,000 to 7,000 royal princes, who have a lion's share of the pie. And the question is raised, "Why not us?" When you add on top of that, as Steve mentioned, this orthodox Wahhabism, I mean, you can't get more Islamic traditional than the Wahhabiis in Saudi Arabia; the King of Saudi Arabia is called the Custodian of the Two Holy Places: Mecca and Medina. So it's considered to be sacred territory, Saudi Arabia, the home of the Prophet, and Medina and Mecca. But yet this very orthodox regime has Islamic radical terrorists trying to overthrow it. Osama bin Laden was a Saudi, is a Saudi. I wish I could talk of him in the past tense but he is a Saudi.

So this is disturbing. Given its importance in the energy sector, what are we going to do if radical change comes out of Saudi Arabia, from within Saudi Arabia? Are we going to send in the Fifth Fleet? Are we going to occupy that country? What are we going to do; what are our options? That's why these policies are so challenging today; we need to really have a broad strategy as Secretary Baker said this morning, we have to use all of the instruments of power that we have; soft to hard power. But really concentrate on the soft power, to try to influence the forces of change in this part of the world.

AUDIENCE: Ambassador, Shrub Kempner from Galveston. I'm having trouble, and I just wonder if you are too, thinking that the initiative in the Middle East, the Israelis and the Palestinians, that at this point is anything more than a place holder, a sort of a last echo, at least for this Administration. And the reasons are the political weaknesses that you mentioned, obviously with the Palestinians and their inability to deliver Gaza, at least at this point, the Israelis with Olmert, and serious political difficulty at home, and a tentative coalition.

Our own Administration, on its last year, and with essentially not much clout to be able to put into any persuasion, just because the next Administration, whoever that might be, will feel differently. If you have

some optimism about the process at this time, to overcome my skepticism, I'd be very interested to hear it.

AMBASSADOR DJEREJIAN: Well, I think the good news is that the President and our Secretary of State have finally gotten engaged in bringing the parties together, and starting a negotiating process along the lines I described. That is the good news.

You're absolutely right in your analysis that when you look at the three parties, we have a President who's at the end of his mandate, an Administration that is going to be leaving in January of 2009; and then we have an Israeli prime minister who is not the strongest prime minister we've seen in Israel, who's been wracked by internal scandals, the war in Lebanon, and has Ibn Netanyahu, the Israeli leader, really yapping at his heels waiting for him to falter so that he can make his bid for the prime ministership. And even within his own coalition, Ehud Ba-ak, the Minister of Defense and a labor leader, he would like to be prime minister again.

So Olmert's position is not the strongest in the world, but he's stepped up to the plate and he's engaged. Abu Mazon, the head of the Palestinian authority, has been terribly weakened by this split within the Palestinian political society and with Hamas challenging his authority. Even in the West Bank, Fatah doesn't have a monopoly on political control in the West Bank. So the Israelis are very nervous about any reconciliation between Fatah and Hamas, but watch that line. They're going to try to do that because at the end of the day, they cannot remain split.

The only hope is that if this peace initiative moves forward and the Palestinians and the Israelis start delivering their goods that I've mentioned, on both sides, the Israelis freeze their settlement activity; they release more prisoners; they lift crossing points; the Palestinians get a better grip on security, start acting like a state, a pre-state and then Abu Mazon can approach Hamas from a better position of strength. So if you're looking for points of optimism, those are the only ones. I hate to use the word, optimistic, but those are small positive points that could occur as we go down the line.

I was surprised they put down a deadline, I think the Palestinians wanted a deadline but I understand that the Israelis mentioned, "Let's try to get this done by the end of 2008," when they were at Annapolis. I don't know how accurate all of that is, but still, both sides agreed to a timeline. If they can do something by then, Godspeed. If not, at least leave something positive, or something ongoing for the next Administration to assume and ride forward on.

AUDIENCE: My name's Steve Stevens and this question is a two-part question for Steve Young. With all of the capabilities that our government has, both overt and covert, why have we not been able to take out Osama bin Laden? The follow-up question to that is, if we did, would it make a difference in the war on terror?

DR. YOUNG: Probably the short answer to the second part is, no. And there are very good reasons for that actually, because when we went into Afghanistan, as we rightly should have, we essentially cut off the head of the snake, but we weren't able to finish the job. So we've got a heck of a problem now with the Taliban resurgence and Al Qaeda remnants located now in the northwest frontier and all of the tribal agencies in that border area between Pakistan and Afghanistan.

Why haven't we ever been able to find him? I think we had a lot of chances, but politics usually plays a role in choosing whether to strike or not, and at the certain times when we had the chance, we didn't take advantage of it. We're still looking for him, from what I understand. He is still probably located in the tribal areas, probably in northern, northwest frontier province. It's a very rugged, very mountainous and very unforgiving region. It's very, very difficult to find any one individual. It's not like we're looking for an entourage anymore.

We were very successful in Afghanistan because we were able to essentially dissolve the Al Qaeda leadership over a period of time. And that has resulted in the dissolution of Al Qaeda into a lot of different, smaller organizations. As far as Al Qaeda itself, it's almost a leaderless resistance right now; we see different or smaller cells swearing allegiance to Al Qaeda as a philosophical organization, more or less, than looking to it for leadership.

AUDIENCE: Nancy Scanlon from Austin, Texas. This may be an obvious question, but I've always wondered. I know that we ostensibly went into Iraq to eliminate the possibility of weapons of mass destruction. Many people suggested that there was a subtext that it was about the oil. What in fact did happen to the Iraqi oil? And number two, why didn't all of those smart people in Washington, knowing that Iraq was cobbled together by the British after World War I, was probably going to erupt into sectarian violence the minute that the strong man was eliminated?

AMBASSADOR DJEREJIAN: Well, they did not know their history and they were blinded by an ideological perception that the road to peace throughout the Middle East was to overthrow these dictators, if necessary by military force, and that democracy would begin to be promoted; at the end of the day it would be much easier to resolve the regional conflicts, especially the Israeli-Palestinian or the Arab-Israeli one, because then Israel would be negotiating peace with democratic neighbors.

I'm not exaggerating; that that was the precept. I have gotten myself in trouble publicly, but I don't care, I'm not longer with the government, by saying that the Arab-Israeli peace goes through Jerusalem. It does not go through Baghdad; it does not go to Teheran; it does not go through other capitals. Arab-Israeli peace should be pursued on its own merits, with the parties. But to think that we're going to democratize the Middle East and somehow parachute a Jeffersonian model of democracy into the sands of Arabia is foolish to say the least.

Now, what I believe we can do, and I believe where our country stands tall, is where we provide the example by what we do here, in our domestic and our foreign policies. We have the prejudice that we are the City on the Hill. But to use that example, we should really promote policies along the lines that Secretary Baker mentioned this morning, and also our domestic policies. You know, one of the biggest public diplomacy failures we've had in recent years is not so much in the Middle East, but Katrina. When I went to the Middle East after Katrina, there were many, many Arabs who told me, "God, we didn't know you were a Third World country like us." Okay, that hurts. But it showed the soft underbelly of the United States. And so when we don't live up to the example and the model that people expect of us in terms of our values and principles, our foreign policy is very, very much hindered.

On the oil question, I can say this: the Baker Institute Council on Foreign Relations in New York published a study two months before we went to war in Iraq in 2003. Secretary of State Colin Powell asked me, because of the Baker Institute Energy Forum, to do an addendum on Iraq's oil structure, so we had our good team here, put together some facts and figures.

You will remember that Paul Wolfowitz, the Deputy Secretary of Defense was saying that if we go to war in Iraq, the cost of reconstruction, the Senators agreeing with me, the cost of reconstruction will be taken care of by Iraq's oil revenues. We amateurs here did our analysis and we brought it to Washington. The Department of State came to the same conclusion, the Defense Department didn't, and the National Security Council didn't.

What we said very simply was that under the sanctions regime that we've had for years in Iraq, and by the way Saddam Hussein's regime was running the oil industry, that the infrastructure was so deteriorated and the capital investment was virtually nonexistent, that Iraq would not be able to produce pre-Gulf-War 1991 levels for at least three to five years, with billions of dollars of new investment. Juxtapose that with what some of our people in government were saying, "This is going to be virtually cost-free because the Iraqi oil will pay for the reconstruction."

Look how much money it's cost the American taxpayer to date. It is forced ignorance; it gets me angry. The reason it gets me angry is because we had the right information. It's not because our government did not have the right information.

AUDIENCE: I'm Bill Wright from Abilene. It seems to me that the second elephant in the room is the old Soviet Union, Russia, and their attempt to intimidate Europe with their petroleum supplies or natural gas and so forth, and the operations that are taking place in the Caspian pipelines and so forth. How do you see that playing out in the immediate future?

AMBASSADOR DJEREJIAN: In other words, Russia's pipeline?

AUDIENCE: The whole of Russia.

AMBASSADOR DJEREJIAN: Right. Putin was here at the Baker Institute about five years ago and he knew that he was in the energy capital of the world. He's a good salesman, and he made a speech here where he said, "The United States and the West should look upon Russia as a much more reliable producer of energy than OPEC." It was a nice statement; got a round of applause. Then of course we saw what they were doing in cutting off gas to East Europeans and to central Europe, and using gas and oil as a political weapon.

My own take is that Putin is a very staunch Russian nationalist; he comes from a KGB background and he's steeped in the security of Holy Mother Russia. I served in Moscow during the Cold War, and during the Brezhnev years, and I see a lot of things I saw then in his attitude for Russia.

Russia, the Soviet Union was an empire, that was drawn down to size after the collapse of Communism, and all other former Soviet Union states are independent, and we know the story of that in East Europe. So I think what Putin's trying to do is to reinvigorate the Russian federation, which is huge, of course. It goes through eleven time zones in territorial terms. But he's trying to restore Russia as a major and a great power, but from a much more diminished position, so he's using oil and gas as a political tool, in a very assertive way. But they're smart enough to know that it's about economics and commerce, and they can take that only too far.

AUDIENCE: You talked about soft power, its importance. It's 2009 and you're advisor to the next President, what would be two or three examples of soft power that you would advise the new President to use during his or her first year?

AMBASSADOR DJEREJIAN: Very politically correct, his and her. Well, I think soft power really translates itself into the things we've been discussing already. It's one, diplomacy; America to lead multilateral coalitions, real coalitions. To use our leadership role in bringing people together, doing the hard work and rolling up our sleeves and getting the international community to be with us on the major issues. Jaw war, not war war, as Churchill said, as the first thing. Always using the military option to act unilaterally, we have to maintain that as an option, but only if everything else goes asunder.

Public diplomacy; the voice of America, if you will. I headed a bipartisan commission, Congressionally mandated in 2003, and we came out with a report, "Changing Minds, Winning Peace," which actually I must give this Administration credit, Karen Hughes and Condi Rice have put about 80 percent of our recommendations on how to reorganize the public diplomacy function. I give them credit for institutionally building up the public diplomacy function after we made a terribly wrong deci-

sion. I don't know if the Senator will agree with me on this, but I think in 1999 when we disbanded USIA, the U.S. Information Agency, that was a wrong decision. Madeline Albright and Jesse Helms came together and they made that decision. I think in retrospect it was the wrong decision. But it's interesting.

With the fall of Communism and the Soviet empire, we thought all of the ideological problems were over. We won; Communism lost. America and capitalism and democracy was ascendant. Fukuyama came out with his book, *The End of History*. What a misnomer. No end of history. We would all become social democratic, liberal democratic states and all that. Wrong. And then we unilaterally disarmed our instruments of persuasion, like the U.S. Information Agency, we cut down the Voice of America, et cetera, et cetera. Now we're trying to reinvent it. That's why our Commission was formed. We gave recommendations on how to reinvent it, and I recommend that report to your attention if this is a subject that's of interest to you.

So soft power is diplomacy; it's public diplomacy; it's the use of economic and social development, building up a new United States Assistance Program, building up our capabilities to help countries that become failed states. We don't have those capabilities. There's a whole array of things that we can do in terms of soft power.

DR. YOUNG: If I could just add, soft power is all about, what the Ambassador says, winning hearts and minds. VOA is something that has kind of gone by the wayside. Also empowering Muslim moderates. We hear a lot about getting the message out, about psy ops and everything like this, but you have to understand the people that you're trying to reach, and the messenger.

How is a Western message going to translate into a Middle Eastern mind-set? When you do broadcast, you've got to be very, very subtle because if Muslims perceive that as intruding on their culture, then you're just not doing any good at all. I saw something very recently about a young Muslim preacher who was actually in Cairo, and he now has his own television station, and he preaches a Muslim, tolerant towards the West message, and a lot of young Egyptians are buying into this. It's on a TV station or channel that is similar to our MTV production.

So you have some relation with the young people in Cairo. This is something that we really should empower and invest in also. But on the ground, things like the provincial reconstruction teams that are going on in Afghanistan. Of course, these things can't exist without security, but at the time, when I was in Afghanistan in '04, there was significant progress. It's essentially a military effort to build civil works: wells, schools. One of the more popular things that we could ever do when we were out and about in the boonies was passing out pads of paper and pencils to little kids, and soccer balls.

AMBASSADOR DJEREJIAN: I couldn't agree more, empowering the Muslim moderates is one of the biggest tasks of soft power that any, I hope the next Administration, whoever it is, that they will really take this forward. It's the only way to win.

DR. LEWIS: I was just going to add one comment to that, and that is that I think China is a good example for understanding the long term influence of soft power, because oddly enough, if you do surveys of the Chinese people and you say, "Do you trust the United States," when it comes to working with the Americans in the future, overall they say, "Yes." If you ask the Chinese, "Do you support globalization," and even the Washington consensus style of development, joining the WTO, they say, "Yes."

But if you ask them, "Do you agree with the American government?" they say, "No." They don't trust the American government, but they trust the American people. I think that's because we've had several decades and generations now of local level interaction; hundreds of thousands of Americans and Chinese going back and forth. It goes at all levels of Chinese society, such that in the '80s and '90s and even now, most of the Politburo members had children who studied in the United States. And they have children coming and going and working. Everybody knows somebody who has lived and worked in the United States. I think what that creates is a very basic level of sharing knowledge and information that is independent of governments. That's one of the strengths, I think, of the American-Chinese relationship in particular that we need to work on with other societies.

AMBASSADOR DJEREJIAN: That was one of the key findings in our Public Diplomacy Commission. Our mandate by Congress was for the Muslim and the Arab world, but it goes globally. What we found out was remarkable. It was that American values are considered to be shared values by many other societies. Life, liberty, the pursuit of happiness, science and technology, American higher education, these are admired in the Muslim world.

Frankly, with all my experience, I was surprised by the positive a reaction and we were talking with Islamists, and not the terrorist organizations, not the Islamic radicals, but we were talking with a lot of Islamist groups from Indonesia to Nigeria, and everything in between. One Iranian woman said, "For God's sake, who can be against life, liberty and the pursuit of happiness? Of course, it's your policies that we're against."

AUDIENCE: My name is Lloyd Lockridge, and this is fascinating, absolutely. Some years ago I read an article in *The New Yorker* magazine, and I'm trying to think of the name of the author, but he subsequently wrote *The Looming Tower*.

AMBASSADOR DJEREJIAN: Yes. Larry Wright. Terrific book.

AUDIENCE: Well, I think so. The message I got out of that article, and which is probably throughout *The Looming Tower* as well, is that the Muslim, radical Muslim attitude goes back a long way, back to the Crusades practically. They didn't like Christianity, they thought our whole way of life was wrong, and that attitude motivated the people who made the attack on New York on 9/11. It's a religious thing; that's what makes these terrorists so fanatical. And I think you all may agree about that. Mr. Ambassador, I don't mean to stir you up again, but what you say is troubling to me because I was not sure that this Administration had the benefit of a great deal of what I think was wise counsel as to what that Middle East is like.

I have heard an explanation for part of it, I don't think I've heard it said here, maybe a little bit, but the fall of the U.S.S.R. led to everyone in our government pretty much just disbanded our foreign intelligence operations; they didn't think they were necessary any longer. So our intelligence about what was going on was very poor.

But was there good counsel? Could the Administration really have been expected to know that it was a hopeless mess? The Russians couldn't handle Afghanistan and they're pretty tough. The British apparently left those places, and they were pretty good at colonial work too.

Why is it that our people thought we could manage that? That leads me to wonder about soft diplomacy and I really enjoyed what Secretary Baker said, and I think all of his ideas are excellent. But what is our hope, really, for doing anything in that part of the world? We've got a great stake in energy, which is why we're here, talking about it. And I'm looking for something that can be done about terrorism and about our future international relations, and I'm still troubled about it. But I certainly enjoyed your addresses, all of them. And I thank you for it.

AMBASSADOR DJEREJIAN: Well, thank you very much for your comment. You've asked a very big question that we could not answer in the remaining time, and it is, "What is the policy?"

I am writing a book. It will be published next year. And it may go beyond distribution to my family, but if you're interested, read it. It's about exactly this issue, the strategic challenge the United States faces in the Muslim world. We are facing a challenge within the Muslim world, a struggle of ideas within the Muslim world, between the forces of extremism and moderation. How the United States crafts its policies to influence this struggle, to marginalize the radicals, is one of the biggest challenges of our time. And God, I pray that the next President of the United States has the wisdom to really do the basic homework and get the facts and then make his or her policy decisions.

And on intelligence, I think you're right. Steve is much more expert in this, but we have really debased our human intelligence capabilities with the fall of the Soviet Union. You can do so much with satellites and technical intelligence, but at the end of the day you have to be trying to deter-

mine what the intentions and thinking of people are. And that's where I hope again the CIA will come back to a much more traditional role.

AUDIENCE: Tom Palaima from Austin, Texas. First off I wanted to thank all of the panelists for restoring my confidence that there is a sane vision of international relations somewhere in the United States. I have two questions. One is about something we've not discussed yet, the viability of nation states; whether nation states are going to be controlling the world in 20 or 30 years down the line as opposed to transnational corporations. Philip Bobbitt, in his well-acclaimed book, has pointed that this is a serious problem. Is the world any longer going to be able to operate under the old model of nation states? So, if you would care to comment on that.

And secondly, it seems that we are skirting around the issue of whether the United States is even 20 or 30 years out, given our tremendous national indebtedness, the overextension of our military power, the erosion of a lot of our cultural values because of these foreign policy decisions over the last eight years, our lack of credibility in our moral suasion internationally, whether we ourselves are going to be capable of being major role players 20 or 30 years out. How that will unsettle the whole picture of what we as people who are living in the United States can expect in terms of energy issues?

AMBASSADOR DJEREJIAN: Well, in terms of your first question, I think there will be nation states. This is just my own prejudice but I really do think that human beings and communities and countries are a bit tribal. We like to keep our tribes together, and we'll have nation states. We'll keep our country together as a certain identity and I think the nation state will remain. You know, the British Empire was a period of globalization, and the Roman Empire was a period of globalization. But you think local and you act global. You act global; you think local. I think the base stone will probably remain, for the foreseeable future, the nation state.

And the second question, we don't have a God-given right to remain a preeminent power in the world. We had to earn it. I think all of us here, with our experiences in life, would agree you have to earn whatever you're doing almost every day. I keep telling our children that. Don't think anyone owes you a favor, you know. You got to prove yourself virtually every day. I get sort of tired of it as I grow older, but I think it's a truth in life. Our country, we've got to earn this preeminent position. And if we continue bad policies, we can lose it. There's no question about it. It really is about maintaining our values and constructing the best possible policies. Then I think America will remain strong. Thank you very much.

CLOSING KEYNOTE ADDRESS:

U.S. Energy Production in the Global Context

JOHN HOFFMEISTER

Senator Cornyn, thank you so much. And thank you for your efforts this past week on the Energy Bill, which we know has a ways to go before it reaches the President's desk. But the nation does need an Energy Bill, no question about it. It needs an Energy Bill that actually sets the platform for a National Energy Security strategy.

Which, ladies and gentlemen, is what I would like to talk about tonight. First of all, kudos to you for tackling one of the most complex subjects that the world faces. If we do not figure this out in our time, it is difficult to imagine what the world will look like years from now.

I may say a few outrageous things tonight. I am sure that the media are not invited, but I would say the same things if they were here. In the last 16 months, my leadership team and I have been in 50 United States cities, ever since the Katrina/Rita shortage of supply occurred in the fall of 2005, extending into the winter of 2006, Americans have faced the conundrum of living on the razor's edge of supply while seeing volatility and consumer prices which are very poorly understood.

So rather than spend shareholder's money, tens of millions of dollars in trying to advertise our way to being lovable, which we know is virtually impossible, we instead decided to take our lovable people who do work every day to bring energy to America, take them to the people that buy the products, that regulate the policies, that set the conditions in which we try to bring energy to the American people. So over the course of 16 months, some 400 Shell managers have joined me on An Energy Dialogue with America. Kudos to you for continuing that energy dialogue today.

Why is energy important? Well simply, it is the base of our economic prosperity. Without affordable available energy, our economic prosperity comes to a screeching halt, or goes through fits and starts as the case may be. In addition, it is the basis of our lifestyle. Mobility is wonderful, whether in a vehicle or in an airplane. We live a mobile life. And we can't imagine a life that is not mobile in this country. We can live in Houston, Texas, because of energy and air conditioning. We can live in other parts of this country, because energy enables heating. It enables the cooling. It enables the lighting. It enables virtually everything that touches our lifestyle.

The good news about energy is we do not lack future resources. We have tremendous amounts of future resources, as reflected in, I am sure you heard about it today, the National Petroleum Council's study looking forward at the natural resource basis that exists around the world.

The forms of energy and the technologies are there, but the public policy challenges that we face in order to bring that energy to people that need it is great. Please allow me to make a few outrageous statements on where we are, and how we got to where we are. And then I will come around to introduce a 12-point plan, which has been shared with tens of thousands of Americans in cities across this country, which Shell believes will bring energy security to this nation.

Let me start with the first outrageous statement: this nation has not had an energy strategy since World War II. In World War II, we had an energy strategy, which was produce everything you can, and ration it to the demand side. That was our energy strategy. We had to. We were in war. Since World War II, we have relied primarily on market economics to create the energy supply side to meet demand side. And wasn't it a wonderful market. From the late 1940s to the late 1990s, that market work beautifully, with the exception of a couple of interruptions in the '70s, in which politics entered the realm of market economics for energy, and we suffered shortages for brief periods. But then we went back to market economics.

In fact, December 8, 1998, nine years ago today, market economics were bringing Americans oil at \$8.50 a barrel. Today we have a tenfold increase in the price of a barrel of oil. How much else in your life has increased ten times in nine years? Has the value of your home gone up ten times? Probably not. Has your salary gone up ten times? Probably not. Have your investments gone up ten times? Probably not.

But the price of a barrel of oil is ten times what it was nine years ago. Markets worked fine until something intervened to stop markets from working. And what intervened, ladies and gentlemen, was an insidious natural resource nationalism, which has impacted not only the oil-exporting countries, but also the oil-importing countries, except for the United States of America, which continued to keep its head in the sand, thinking that market economics would bring us future energy supplies.

What do I mean by that? Natural resource nationalism means that anybody who produces oil for export wants to manage their resources as a matter of national sovereign policy, which they have the right to do. We shouldn't complain; it is their natural resources. We believe in sovereign rights of nations. They have the right to do that. Those oil-importing nations, particularly developing economies, such as China or India, and including the United States of America, have the right to import what is available on global markets.

But here is another outrageous statement: the American people are one of the few peoples in the world that pay the full price of energy. Do the billions of people in developing countries like China and India pay the full

price of energy? Absolutely not. As a matter of natural resource nationalism, oil-importing countries are subsidizing the price of energy, because the interests of economic development take precedence over the actual cost of a barrel of oil. And that is likely to continue.

So the United States, in its head in the sand approach, continues to import ever more oil, passing the full cost of that energy on to the American people, while we compete internationally with countries that subsidize the cost of energy in the manufacturing of products, the development of their economies, which they have the right to do. How about a little United States natural resource nationalism, so that the 65 percent of imported oil that we rely upon every day could somehow start going down in terms of percentage of what is needed?

Domestic production, which is now some 35 percent, somebody my age, when they were a child, the nation was importing 10 percent of its oil. Today, we import 65 percent, about 21 million barrels a day. Which means that about 14 million barrels a day are coming in from elsewhere, while we continue to leave hundreds of billions of barrels in the ground in our own country. A company like Shell has access to 15 percent of the Outer Continental Shelf. Eighty-five percent of the Outer Continental Shelf is off limits to oil exploration and production.

Senator Cornyn helped lead the way in the Energy Act of 2005, which for the first time in 25 years allowed new access in the eastern Gulf of Mexico, an area called Lease 181. The first time in 25 years new access was granted. Natural resource nationalism in this country means keep it in the ground. Don't let people go get it. While we rely upon that diminishing pool of exports which the rest of the world is competing with, and which drives this tenfold increase in oil price.

What is interesting about the dilemma we face with energy security is the contrast with how well this country deals with other insecurities. There are three fundamental insecurities in this country that Americans don't like. First is homeland insecurity. We don't like homeland insecurity. It is what caused us as a nation to become a nation in the first place. We didn't like other countries owning or controlling something in this country. And over the last several hundred years, our federal government has worked extremely well in bipartisan fashion to deal with the bipartisan insecurity problem of homeland security. Not just since 9-11, but for hundreds of years. We have protected our homeland.

I remember as a kid in the 1950s, getting ready to go to bed at night. Seemed like every night, there was this black and white commercial on TV saying to the youth of America, sleep well tonight. Your National Guard is awake. Many of you may remember that commercial. We have been looking at national security for a long time. And we do a good job of it in bipartisan fashion.

The second insecurity we deal with is financial insecurity. Americans don't like financial insecurity. We look at the unemployment numbers every month. The Federal Reserve Board looks at interest rates on a con-

tinuing basis, and we watch like hawks; what are they doing to raise or lower interest rates on a periodic basis.

When there are issues, when the dotcom industry melted down, what happened? We got Sarbanes-Oxley, which is a good step forward in terms of controlling corporate governance, which was out of control. Now that we have the subprime mortgage issue, Congress and the White House are working together to try to find solutions to the abuse and the greed of people who make money from poverty in this country. And we will find a response to that.

But when it comes to energy security, it is a bipartisan problem for all Americans, we are faced with such partisanship, that we can't find a solution. And we are suffering the consequences of that, created by this partisanship, an insidious social injustice, which in a country that favors equality, creates further inequality for the haves and the have nots by having too expensive energy.

Those who can least afford it are now making choices of food over fuel, of medicine over fuel, of other life choices, because of the high price of fuel. Drive-offs at our gas stations are at record highs, and have been for the last two years, because people can't afford it. And it doesn't have to be that way, because we know the resources are there.

An additional point, in large measure, and this is an outrageous statement, I blame my own industry for the partisan predicament we have on energy security. For too many years, my own industry, oil and gas, has made its positions known in a partisan fashion, rather than a bipartisan fashion. For too many decades, my own industry has failed to communicate the issues, the uncertainties and the problems it faces with the American people, with the Americans who judge us.

So now we have this pejorative that floats all over the country called Big Oil. You hear the phrase Big Oil and what does that conjure up? It doesn't conjure up pleasant thoughts. Yet Big Oil only produces 15 percent of the daily supply to the world. The top six international oil companies added together produce about 15 percent of the world's daily supply. That is not big at all.

When I think of Big Oil, I think of the tens of thousands of Shell people that face risk every day. Tonight, they are in the Gulf of Mexico. Tonight, they are on the North Slope. Tonight, they are in the jungles of Nigeria, bringing energy to the American people. The Big Oil I know are these tens of thousands of people who take these risks.

The industry has done it to itself, but in a recent Gallup Poll published this fall, the oil and gas industry has a favorability rating of 25 out of 25 industries. We are 25th in favorability out of the top 25 industries in America. What kind of public policy does that invite? It invites vilification by reputation, and it invites punishment by public policy. Guess who is in 24th place? The federal government of the United States.

It is in its own self-interest not to allow it to fall to 25th place. What the nation needs, ladies and gentlemen and you know it full well, is a coher-

ent, comprehensive, integrated energy security strategy to offset the consequences of natural resource nationalism. We are not running out of energy. Absolutely not. There is plenty of energy in the ground. Plenty of what we can do across a wide range. But we must do something, and we must do something now. We need a short term energy security strategy, a medium term energy security strategy, and a long term energy security strategy, if we are to satisfy not just our needs, but the needs, as the Native Americans would say, of our grandchildren's grandchildren, which is time indefinite.

What we need to address is a short term energy strategy which brings more gas and oil to the American people. Gas and oil is not particularly popular, as I can attest from the humbling experiences of hearing that from tens of thousands of Americans firsthand. And that is fine in principal when we get to the medium and the long term energy strategy, but today and tomorrow, next month, next year, for the next decade at least we need oil and gas. America uses 21 million barrels a day of oil, which represents 10,000 gallons a second. You don't replace 10,000 gallons a second overnight.

I have 14,000 Shell stations in this country that need refilling every day, so people can go to work, so police cars can do their patrols. The fleet of America is predicated on oil. And it is not going to change over night. It takes 20 years to change America's fleet. So for the next ten years at least, we need more oil and gas. Because at 10,000 gallons a second keeps rising, as it should in a growing economy.

Shell has developed a 12-point strategy for the future, a comprehensive energy strategy that addresses the supply demand, the technology, the political, social, economic and human resource issues of the future. It starts with more conventional oil and gas.

The hundred plus billion barrels in the Outer Continental Shelf on the millions of acres of federal land can be developed. Public policy could help that be developed by granting more access. It is unrealistic, we know, politically, to ask for 100 percent of the Outer Continental Shelf. But must we limit ourselves to 15 percent? What about 20, 25, 30 percent of the Outer Continental Shelf, while preserving the coasts of California or the West Coast or other sacred parts that are not yet ready politically to be developed? What about the rest of the Gulf of Mexico? What about off the coasts of Alaska? What about gas exploration off the East Coast? More conventional oil and gas is necessary.

Secondly, we must develop unconventional oil and gas such as the tar sands of Canada and the oil shale of Colorado. Let's give credit to our Canadian neighbors. More than 10 years ago, as a national energy strategy, the Canadians opened up the development of the oil sands of Alberta. Today, a million barrels a day are being produced. Shell is heavily involved. We are at 150,000 barrels a day with investment to go to 300,000 barrels a day. Others are also investing heavily. A nation that decides to do something can get it done.

We know that there are a trillion barrels, a trillion not a billion, a

trillion barrels of oil and gas locked in the Piceance Basin of Colorado, Wyoming and Utah. It has been a struggle to even do the research work that Shell is doing out there to try to use new technology, not mining technology, but NC_2 technology to try to make it possible to develop those reserves. We have a sequential plan that is unfolding.

But every time we turn around, we face the same negative impact of public policy in terms of getting permits. In the current energy legislation, there is language that would prohibit the setting or the payment of resources to establish a royalty system for the development of oil shale. Without a royalty system, we can't develop the oil shale of Colorado. An example of public policy getting in the way of natural resource development.

Thirdly, we need to bring liquefied natural gas into this country in major quantities. There are a couple of re-gas terminals in existence in this country. Some are thirty years old; Cove Point, Maryland; Elba Island, Georgia; Boston Municipal. So there are some regasification terminals. But if you look at the supply demand curve of the future, and the fact that utilities love natural gas to make clean electricity, as they should, and they developed turbine technology to come off of natural gas, the IGCC technology, Integrated Gas Combined Cycle turbine, this kind of technology brings clean energy to America. But there isn't enough natural gas to meet the demand of the next ten years, unless we build regasification terminals.

Building a regasification terminal takes you right into the NIMBY issue. Where Shell has been working very hard to bring natural gas, liquefied natural gas, let's say, to New England, through a regasification terminal called Broadwater, with a partner, TransCanada in the Long Island Sound. Not in anybody's backyard, it is in the water.

It is ten miles, eleven miles off the Connecticut coast, nine miles off the New York coast, in Long Island Sound. Seven thousand ships a year go up and down, traversing the Long Island Sound. It is being resisted by people saying they don't want to commercialize the Long Island Sound. And instead of being in nobody's backyard, it happens to be in everybody's back yard, everyone who lives in Long Island and in Connecticut.

We have been told by the Attorney General of one of the states, "If you get a permit to do this, we will do everything we legally can to make sure you do not build this project, which is the wrong project at the wrong time in the wrong place. Take it to Maine." That is what he told me. What do you do against those circumstances? You keep going, is what you do.

Fourth, and I know you talked about this today, we need to develop our coal resources using gasification processes instead of burning pulverized coal. We can gasify coal molecules and we believe the technology exists to capture the carbon and to sequester it in the ground. Public policy could enable pilot experimentation and testing of carbon capture and sequestration.

The Future Gen project funded by Senator Cornyn in his efforts offers that opportunity, but just for one isolated example called Future Gen, and in only one geology. There are multiple geologies around the nation which

need experimentation and testing to see if carbon capture really can work. We believe that should move forward.

Let's move on and talk about biofuels. Biofuels are a necessary part of our future liquid energy supply. Shell has been in biofuels for 30 years. We are not afraid of biofuels. We will be making an announcement this week on a big biofuel project. But we have partners that are working with us in the development of cellulosic ethanol, and biodiesel, looking at what are those crops in nature, mainly waste crops, not food crops. Shell draws the line. We don't invest in ethanol from food crops. But we will invest in ethanol from waste crops such as straw or cornstover or switchgrass or sawdust or wood chips, all of which provide cellulosic material for biofuels in the future.

We believe that there is opportunity there to blend biofuels with gasoline, and stretch the gasoline supply by 10 percent. And then in the future, when we can produce even more biofuels, the flex fuel vehicles will make a difference in the American fleet at E85, although E85 has yet to be well accepted by consumers, because for basically the same price, you get 25 percent fewer miles. And we will see how consumers like E85. We are testing it in Chicago. We sell about two tankfuls a day per station. That is not going to keep the station going very long.

Additionally, wind makes a difference. We announced in August the potential of the world's largest wind farm in Briscoe County, Texas, working with TXU. Briscoe County, Texas, is way out there. It has a lot of wind, and it has very few people and very few birds migrate through there. But Briscoe County itself isn't a market. Dallas-Fort Worth is the market. San Antonio is the market. So how do you move wind electricity that great distance from Briscoe County all the way to Dallas or to San Antonio to feed the grid? This would be a three gigawatt wind farm. That is big. We need transmission lines. Public Utility Commission needs to grant access and an opportunity to recoup the costs through utility rates. It is a struggle to get a transmission line built in this state, as you well know. But we will continue to work wind. Shell today has seven wind farms in five states. And we will continue to grow that business.

There are solar opportunities as well. Shell recently sold our silicon-based solar photovoltaic business, because we don't believe silicon is the future of solar production. We believe future nanotechnologies will be far superior to the density and the low efficiency of silicon as a base for producing electricity. So we are investing now in thin film technology. For those of you who are chemists, it is called copper indium diselenide. It is a light substrate that sits on glass that is much more efficient in the production of electricity from the sun. But we believe there are even more technologies to be developed.

And then there is hydrogen and hydrogen fuel cell vehicles. Friday a week ago, I happened to be at the test track in Dearborn, Michigan, at Ford Motor Company as part of my membership in the nation's Hydrogen Technology Advisory Committee with the Assistant Secretary of Energy,

along with the three American manufacturers, GM, Ford and Chrysler. We all drove six hydrogen fuel cell vehicles, two from each of the manufacturers. And ladies and gentlemen, if you have driven a hydrogen fuel cell vehicle, you would say to yourself, "I want this car." This exceeds the mobility and driving capability of the internal combustion engine. I will come to the internal combustion engine in a moment.

So we have hydrogen, solar, wind, biofuels, conventional oil and gas, unconventional oil and gas, coal gasification and liquefied natural gas, all as sources that could make up an energy security strategy. But we are not done yet, there are still more. There are four more points to be made. We must come to grips with greenhouse gas management as part of that strategy.

It is Shell's view that the debate is over on climate change. We do not believe that there is any more value in debating the subject, when most of the world's leaders want to deal with it. Let's deal with it. Let's get down to solutions. That is why Shell has joined the United States Climate Action Partnership with several other energy companies and utility companies and NGOs. That is why we are saying to the Senators today that the Lieberman-Warner bill, while not perfect, should not be automatically killed. Because it is the foundation for conversation about a cap and trade system that could actually do benefit to this country. So let's use it as a basis to talk about it.

The current bill is probably not where it needs to be, but we believe it is time for the federal government to lead on this issue. It is not helpful for a company that works in 50 states to deal with greenhouse gas policies state by state, because the wind doesn't stop at the state's border. In addition, it is time for federal leadership on the efficient use of energy. We believe that a framework that drives efficiency in the use of energy can also be helpful, as we have seen in certain states. California has reduced its energy per capita by regulations which require more efficient use of energy.

It is time, ladies and gentlemen, to recognize that free market economics don't work when it comes to energy. It requires natural resource nationalism aficionados to help drive public policy that can help in the long term saving of energy. The energy molecule not used is preserved for future generations.

It is time to deal with incandescent lights, which use 3 percent of the energy to produce light and 97 percent of the energy to heat the room. It is time to deal with the internal combustion engines, which use 20 percent of the energy to give you mobility, 80 percent wasted as heat. It is time to deal with aircraft where 8 percent of the energy gives you push, 92 percent of the energy is wasted as heat. These are examples of why we are using 21 million barrels a day; because of the inefficient technology. Thomas Edison invented the light bulb, for Pete's sake. More than 120 years ago, the technology is basically the same. There are alternatives. We can move on from there.

The hydrogen fuel cell vehicle with a push from the federal government

can go a long way towards helping those auto companies. Shell is ready to start building a hydrogen infrastructure, but we can only do it when there are cars available to buy the product.

Two more items. Education; the human resource understanding of energy economics and energy reality in this country is poor. That is an understatement, not an outrageous statement. We don't teach energy, the base of our economic capabilities and prosperity, the base of our lifestyle choices. We don't teach it in our schools. Not until you get to college, do you begin to learn, if you are dedicating yourself to a science or a geology or a geophysics career, do you learn about energy. Energy is the end of a light switch. Energy is the gas pump. That is what most Americans think about energy.

Energy education is necessary. Shell is not just talking about it. We work with Scholastic to develop a website accessible to every middle school teacher and every high school teacher in the country to teach a semester's worth of energy education. Not selling Shell, but really talking about energy concepts and STEM education (Science, Technology, Engineering, and Mathematics) which this nation needs more of.

And then finally, respect for other sources of energy, because there is no silver bullet. Shell doesn't have all the answers. Nuclear, geothermal, hydropower, wave energy; these are other sources of energy which have yet to be fully developed. But Shell is not resisting, because we know we need more energy.

So there we have it, ladies and gentlemen, twelve simple steps to energy security. All it takes is the bipartisan leadership of our nation's leadership to enable it to happen. Thank you very much. I know I am keeping you from your dinner, but if there is a question or two, I would be happy to try to answer them.

Discussion:

AUDIENCE: To what degree is Shell involved in coal reserves?

MR. HOFMEISTER: To what degree is Shell involved in coal reserves is the question. We actually sold all of our coal reserves over the last decade. The last transaction took place in about the year 2000. But we retained the technology for coal gasification. So we are heavily involved in coal gasification projects in China. Believe it or not, we are involved in 15 coal gasification projects in China. All of which are helping to better use the molecules. We are involved in coal gasification projects in Australia. Now the good news is, we announced our first coal gasification involvement in the United States with Baird Energy in Ohio. That is a long way from production, but it is a step in the right direction.

AUDIENCE: I wanted to address your point about why we pass along the total costs to our consumers. First of all, in Europe, I don't think they

pass along the total costs. I think we heard this afternoon, they charge \$7.00 a gallon for gas. And they take that tax money, and use it for social programs. We don't do it in the United States. It will take a federal government that is not spending itself ridiculously into debt in order to have the wherewithal to not have to pass the costs of energy on to the consumers.

Last year, do you remember being in Dallas, when we had the head of the Federal Reserve Bank in Dallas talking about our economic situation? I have just heard Jamie Galbraith in Austin talking about the severe crisis of our international debt indebtedness. The head of the Federal Reserve Bank in Dallas said our role in the world economy is to consume without any indication of where the end game is.

So my question to you is how does our government, given the outrageous debt we are now in, embark upon a policy of not passing the cost of oil on without taking on enormous additional debt?

MR. HOFMEISTER: Well, it is worse than you described. Let me tell you how it is worse than you described. If you add up the sums in the last four years, we have put \$2 trillion of cash on a barge and pulled it over to the Middle East. We have put \$2 trillion of cash into the Middle East to develop oil and gas reserves in the Middle East. That \$2 trillion could have been put into this country. Consumers paid the money. They paid the money to import the oil, instead of putting the money into this country to develop the infrastructure, the jobs and the natural resource development projects; we pushed it over to the Middle East, and contributed to the weakness of the dollar in the meanwhile.

I avoid the issue of war. I am sorry; I am not a policy maker or a politician. I am an oil company executive. But on the issue of natural resource development, we are weakening our own economic base by not investing in this country.

Europe has done a bold step. Europe has indeed not just passed on the full cost of energy, but has added a tax on the full cost of energy to affect public policy such as mass transportation and greenhouse gas management, which the consumers of Europe pay for. That takes willpower. And the Parliamentary systems of Europe came together through the EU to make that happen some years ago.

It is even worse. Here is another example. The EU also came together in its sovereign nations, and agreed to a dieselation of Europe. Meaning that today, 50 percent of the European fleet has diesel engines in their cars.

We have looked at it. And our technologists have said that if we had the same percentage of diesel engines in this country that Europe has in Europe, we would use 3 million barrels a day less oil full stop. It's because those cars are getting 40 plus miles to the gallon. Our cars are getting 20 miles to the gallon, and so we are not getting the benefit of a simple technology called diesel engine.

And these are not the diesel engines that your grandfather used to

drive; these are diesel engines that are efficient with less emissions than today's internal combustion engines, ladies and gentlemen. But again, it takes a national leadership policy to make something like that happen. Thank you all very much. Enjoy your dinner.

MEMBERSHIP DISCUSSION

KENNETH MEDLOCK, *Moderator*

MRS. WILSON: Hello. Thank you. Ken Medlock is going to give us a recap and entertain questions. We may get out a little earlier than we have on the schedule, I expect we can. But before I do that, I want to give my sincere thanks to Terri Killen, who is the new staff person for the Philosophical Society of Texas. She has been wonderful, and I want her to stand up so you will all know who this wonderful woman is. Without her, I couldn't have muddled through. And I deeply appreciate it. Thank you. Ken, would you?

DR. MEDLOCK: It is a pleasure to be here this morning. Yesterday was certainly full of very interesting and topical discussion. As you know, at the Baker Institute we do a lot of research that is geared towards energy markets. I am a Fellow in Energy Studies. I work very closely with Amy Jaffe, whom you all heard speak Friday evening. She is really a specialist in geopolitics, and how geopolitics affects what happens in global energy markets. I, on the other hand, I am an economist. I typically do a lot of the modeling that is in the background, that you don't necessarily see, all of the technical aspects of.

Having said that, I guess it is important for you to know what I actually model. So I will give you a little hint at that. It really has to do with how different fuel choices affect outcomes, ultimately. I have done a lot of modeling of natural gas markets. How events in natural gas markets will affect power markets. And of course, when you get into power markets, you have to think about nuclear and coal and solar and wind and things of that nature.

I've also done a bit of modeling of crude product markets. Looking at gasoline prices and what actually drives the price of gasoline in this country and elsewhere. What sort of long run and short run factors are important there. And of course, a critical element in understanding what drives prices ultimately is geopolitics. That is what makes our team so successful, I think, we really do feed off each other very nicely.

A common theme in the morning yesterday was that of diversification. I made the comment at the end of the panel yesterday that what we should have taken away from that was a lesson that we all learned in investment 101: diversification. A diversified portfolio is the key way to making sure that your investments are sound and successful. Over and

over again, unfortunately, we learn the lesson that if we put all of our eggs in one basket, we really do expose ourselves to a great deal of risk. We can end up not only with our personal wealth, but in the aggregate, feeling a lot of pain if things go south in one particular area. So I hope that is what everybody took away from that.

There is a lot of movement in the country away from coal. I will just tell you up front, I think that is unfortunate because the issue with coal is a technical one. It is not an economic one. And unfortunately, politics is really muddying the picture. To give you an idea of why I think that, I guess it was Corbin at the end of the panel in the morning yesterday who actually made the comment that we use a lot of coal, because that is what we have. Well, if you go around the world, you will see that is the case in any country. If a country has a particular endowment of a particular fuel resource, that is what they use first, because it is close, it is cheap, and they develop an expertise in using it. Well, about 51 percent of our electricity generation comes from coal. And to give you an idea why, we hold in this country 27 percent of the world's coal reserves. That is an absolutely staggering figure.

To put it in perspective, Saudi Arabia holds about 12 percent of the world's crude oil reserves. So our presence in the coal market dwarfs that of Saudi Arabia's in the oil market. Twenty-seven percent of the world's coal reserves is a massive number. To put another number to that, China is actually third in the pecking order, and they have about 12 percent of the world's coal reserves.

We hear a lot about growth in coal consumption in China. We are certainly concerned about it because anybody who has been to Shanghai, or Beijing or really any of the cities on the east coast where there is a lot of very robust economic development knows that there are days when you look up, it is actually clear, but the sun looks like a hazy spot in the sky. Pollution is a very real concern.

Having said that, there are things that we can do to deal with it. I am sure all of you have seen in history books, the pictures of the Industrial Revolution and the big smokestacks blowing black smoke into the sky. Well, a lot of that was coal consumption for the production of steel and other heavy industry. As personal wealth grew, people began to change their priorities, a roof over your head, food on your table, clothes on your back, those were sort of givens at some point when we achieve a certain level of personal wealth. It is important to understand, all the way through that process of wealth, growth in personal wealth, caring about the air we breathe comes last. There are just other things that we care more about. And not until those things are achieved, do we begin to focus on those other aspects of our life.

Unfortunately in countries like China and India, those other aspects of our lives, like the air we breathe, are really farther down on the pecking order. So it is going to be very difficult to bring those developing economies, that are seeing a growth in personal wealth, it is going to be difficult

to bring those countries into the fold when we think about things as broad and global as the Kyoto Protocol.

When the West in general went through our Industrial Revolution and growth in personal wealth, we didn't have anybody to learn from. There was nobody who had already gone through that process prior to us. But when you look at the case of China and India, they do have that. They have us. And whether or not they want to approach us to help with their pollution problems is really not the issue. There are certain things that we can bring to the table in policy discussions and in the political debate that can actually act as a bargaining chip. For example, the transfer of technology to help improve local pollution.

And that is really what we are talking about first and foremost, is local pollution. It is SOX and NOX and particulate matters. It is not CO₂. Because that is the first thing we focus on. That is why there are scrubbers in these big industrial smokestacks that act to remove the sulfur dioxides and the nitrous oxides and the things that cause an immediate health issue. So when we think about global economic growth, and global economic progress, we really have to be thinking about the globe. Not what any one individual region does.

And something like global warming, which was discussed yesterday as well, really is a *global* problem. We have to come to the table when we want to deal with a problem that is global in nature like that, and be willing to use whatever means we have as long as they are peaceful of course, to promote a reduction in CO₂ emissions, if that is indeed our goal. If that means when we go to the table with a country like China or India, and they have a lot of coal, they are going to use coal because that is what is cheapest. That is what is right there in their back yard. Then we should be willing to promote the sharing of technologies that enable them to use that fuel source, which is the cheapest fuel source they have at their disposal in a clean and an environmentally friendly manner.

We all benefit when a country like China grows. We all benefit when a country like India grows. Not only do we benefit economically, because they actually bring to the table a whole wealth of goods and services and expertise that just facilitates economic development globally, not just within those countries. But we also benefit because one of the key and probably most successful things that we have at our disposal when it comes to dealing with conflict, is economic development. If you look around the world, those regions of the world where terrorism is really a problem, where local conflict is really a problem, where there is really concern about local uprising, you don't hear about this in developed countries. Why is that?

Well, it is because in developed countries, there is a certain level of wealth that most people have achieved and there is a certain level of hope that is accompanying that wealth. When you strip away hope from an individual, you facilitate that individual to move into using very drastic means to try to get a point across. And that is ultimately what we are talking about.

With that, and we can branch off in discussions about ethanol, about coal. We can talk about gasoline. Anything you guys want to talk about that is on your mind, maybe even wasn't addressed in a lot of detail yesterday, please feel free to ask the question.

MRS. WILSON: You said that we hold 27 percent of the world's coal. How do we know that is so? There is a vast country like Russia. How do we know how much coal is in there or not in there?

DR. MEDLOCK: It obviously is based on reporting. Russia is actually the second in the pecking order. They hold about 16 percent of the world's coal reserves. That is just what they report. So we don't know for sure. It is the same with crude oil. It is the same with natural gas. There is a certain reporting standard that you have to adhere to when you report reserves. It is what is economically recoverable at that time. As we move into the future, if the price of coal were to triple, coal reserves around the world would go up, because what is economically recoverable at that time would be larger. So certainly that is an issue.

AUDIENCE: Thank you. I would like to respond, I am afraid not to your talk, but to Mr. Hofmeister's comments last night. I agreed with a great deal that he said. But there were two points on which I feel compelled to disagree. One of them was his first point, which was that we should work harder and have the Government allow us more rapidly to extract oil that is within the control of the United States offshore, off the North Slope of Alaska and the Gulf of Mexico. That would be very beneficial in the short run. But I think a terrible policy for the long run. And I care about the long run, because I now have a young grandchild to worry about.

At the present, although there is a cartel, OPEC, which can to some extent control prices, there still is a large measure of competition in the world, which prevents any one group like OPEC from just deciding to charge whatever the market will bear. There is oil in Russia and in North America and in the North Sea and in the United States, outside the control of OPEC. If in fact the United States made all of its oil off the North Slope of Alaska and the Gulf of Mexico available, it wouldn't increase the competitiveness of the oil market that much. But looking into the future, when my granddaughter is grown up, just looking at the reserves, where the large reserves of easily recoverable oil are, we face a future in which almost all of the available oil, easily available oil will be in the hands of a few countries in the Middle East.

That is a horrifying prospect, both because they can set the price then, as they like, and because they can blackmail us as they tried to do in 1973. And at that point, it would be an inestimable value for us to have oil still in the control of the United States, still in the ground. So I think the idea of attaining energy independence by getting rid of American oil as rapidly as we can is a policy that might suit Shell Oil, and might suit many politi-

cians, because it would help matters at present. But for my granddaughter's future, it is just a terrible idea.

If anyone wants to disagree, I would be very glad to hear where I am wrong, but I think we should perhaps explore American oil, but keep it in the ground, against the day when there is very little oil left in the world, except in the hands of a few countries in the Middle East. The other point on which I disagree with Mr. Hofmeister was the 13th point, which he didn't make. Tom Palama made it, and he then sidestepped it. And that is, that there is a way of improving the situation at present which takes some political courage. That is having a steep tax on the consumption of oil, a tax at the gas station for example, with some arrangement to mitigate the effects on people of low income.

It may not be forever politically impossible, if we started talking about it. If scholars and journalists; I see Tom Friedman does talk about it, would talk about it. If politicians, perhaps Senators at the beginning of a six-year term, when they don't have to face reelection, would start working toward this. And I am a little sorry that there hasn't been more discussion at this meeting, of the idea of a gasoline tax at the pump, as a means of mitigating many of the problems that the world faces, because of the fact that so much of the world's oil is in the hands of countries that are not very friendly to us.

DR. MEDLOCK: If I may respond just briefly, and then we will pass it along to you guys. I think I believe what John was referring to last night was probably the opening of not only the Arctic but the Outer Continental Shelf in the Atlantic and Pacific Basins, as well as the Eastern Gulf of Mexico. I agree with one part of what you said. Opening those potential reserves to exploration and development really only pushes the problems we face today into the future. But that is in general the case for any depletable resource, which is what we are talking about. We are talking about oil, there is a finite stock of oil in the ground.

As a resource economist, when we think about extracting and using a depletable resource, those are what we call transition fuels. What they do is bridge the gap between whatever we are doing today, and what we will be doing at some point in the future. They are by definition transition fuels, because we will run out. It is just the reality of the matter. Now what does run out mean? And this was sort of brought up in the peak oil discussions that were alluded to briefly yesterday. But depleteability, or peak, is really an economic concept.

That is what I think is lost on a lot of people when they think about peak oil. We don't begin to see declines in global oil production because we are physically running out of oil. We begin to see declines largely because the next barrel that we want to extract is expensive. And so we move to the next best alternative. When you think about what M. King Hubbard predicted to U.S. oil production, he predicted quite accurately that U.S. oil production would peak around between 1966 and 1971. It actually did peak in 1970.

A lot of people use the statistical analysis that he used and apply that to global oil production to make these very dire predictions about what is going to happen to global oil production. The trouble with that extrapolation, if you will, is that U.S. oil production had a very cheap, readily available substitute; imported oil. So we could move from that next barrel in West Texas that was much more expensive, to importing a barrel of oil that was a direct substitute for that barrel. Production could begin to decline indeed, and we wouldn't see necessarily an increase in price.

Now what happens globally, when we start to see the next barrel of oil become more expensive, price begin to rise. And that does all sorts of things: it encourages exploration and development, efficiency and conservation in use, development of alternative technologies. So there are lots of things that start to happen when we see oil prices start to approach the levels that are approaching today.

One thing that wasn't brought up and I think this is very important, when you start to think about why certain things aren't happening faster. The effect of the weakening U.S. dollar on the barrel price of oil was not really brought up yesterday. That is some stuff we have actually looked at, at the Baker Institute. If you hold the US/euro exchange rate fixed at what it was in the year 2000, on the average, it was about 92 cents per euro in the year 2000, if you hold that fixed and you look at what has happened to the euro value of a barrel of oil since 2000, and then you use that exchange rate to figure out what that means for the dollar price of a barrel of oil. A barrel of oil today only costs about \$57. That is a staggering impact. And that is basically the result of the declining value of the U.S. dollar. So when we think about approaching a 90 to \$100 world, it is not all of the issue is not growing demand and lack of supply.

There is indeed an issue of oil traded in dollar-denominated contracts, and the dollar is significantly weaker than it was just five to seven years ago. If you want to think about what a European consumer for example, is paying for a barrel of oil and what it means to the European consumer's pocketbook, it is nothing like what it means for our pocketbook.

One other issue you raised was a gasoline tax. You will be hard pressed to find an economist who disagrees with you. The best way to alter consumer behavior is to alter the price of the goods that they buy. Quotas and other schemes that are really designed to try to alter behavior or limit consumption, ultimately, they don't send the right signal. If we had a gasoline tax, it would do a couple of things actually. It would not only raise the price of a gallon of gasoline, but most of that price would actually fall on the consumer. It would not fall on the producer. And that has to do with the fact that the demand for gasoline is relatively inelastic.

Gasoline demand doesn't move a lot when you increased the price. It will move some, but not a lot. When you have a relatively inelastic demand, that means the effect of the tax typically tends to fall on the consumer and not the producer. So the producer shouldn't be up in arms about this. In fact, there are a lot of producers who are not, they would not be opposed to a gasoline tax.

But what it does on the consumption side is it begins to make us think internally about our own habits. Those of you who are from the Houston area, you go out on the highway in rush hour, and you know it is just a log jam. You can't get anywhere. You look around and there is one person in every car. And that just fundamentally doesn't make any sense. If the price of gasoline were double what it was today, maybe you might see an altering of behavior.

There was actually a study done, I think it was by the Government Accountability Office, to look at what level prices would have to reach to actually see a noticeable change in consumer behavior. We are talking today, \$2.50 to \$3.00 a gallon. We haven't really seen that significant a change in consumer behavior. What they estimate is that we have to see gasoline prices in the \$7 to \$8 range before we see a noticeable change in consumer behavior. So you are talking about a gasoline tax that is in the order of \$4.50 to \$5 a gallon.

Any politician that stands up and says, that is what we ought to have, you can guarantee, they will be voted out of office. And that is the problem. It takes a lot of courage to stand up and say something like that.

AUDIENCE: Well, I am glad that you seem to be agreeing with me on the second point. But on the first point, when you talk about the petroleum in the ground as a transitional fuel, there seems to be an implication that it is a transition to some future in which something else is going to take the place of this kind of easily recoverable petroleum. It is not clear what that is going to be.

In particular, if you imagine the future in which there is easily recoverable oil in the Middle East, and by the way, when I raised my question, I was careful. I understood the point you made. I was careful to say easily recoverable whenever I referred to gasoline. Because I know there is lots of gas. There is lots of petroleum in the world that is not easily recoverable. Like the tar sands in Alberta. But if you imagine a world in which all the easily recoverable oil is in a few countries in the Middle East, and then there is lots of oil in the tar sands, which costs twice or three times as much to extract, that is an unpleasant situation. That is a situation in which we can be blackmailed. We can be starved.

We can have our wealth extracted by the price that we have to pay for that oil in the Middle East. Which, high as it would be, would still lower than the price we would have to pay for the oil from the tar sands. It is that world that I am thinking of as a world in which it would be wonderful to still have some easily recoverable oil in the ground in the control of the United States.

DR. MEDLOCK: Sure, I understand your point. And that was my point about price sending a signal to consumers. Really, maybe it was lost in what I said. To give you an idea of the effect that efficiency and conservation can have, in 1978, the average fuel efficiency of a vehicle on the road

in this country was about 12 miles to the gallon. By 1990, that number increased to 21 miles to the gallon. That was a 75 percent increase in fuel efficiency in about 12 years.

During that same period of time, we saw more cars on the road. We saw on average, individuals were driving their vehicles more miles per year. So you just think about those two things, and you would think, well, fuel consumption should have gone way up. Well in fact, if you draw a line from 1978 to 1990, it is flat. That is the impact that efficiency can have. It is in effect, a virtual source of supply. That is why things like proper price signals that encourage changes in consumer behavior, not only help conservation in the short run, but in the long run, thinking about the kind of car you purchase the next time you are purchasing a vehicle. Those sorts of things have very far reaching and potentially very large impacts.

Fuel efficiency is an incredible tool that we have at our disposal. We are one of the richest countries in the nation. We have the wherewithal to invest in new technologies that improve efficiency and encourage conservation. You just have to ask yourself, why don't we do it? It is really the first best weapon we have, when we think about competing or combating the potential threats that we face from oil producers globally.

AUDIENCE: Michael Granof from Austin. I would just like to say that I was taken aback by the talk last night. If I had just read that speech, and didn't know who gave it, I would have thought that it was written by a committed Socialist. His first comment was that the market is not working. And yet, the traditional explanation for high gasoline prices and high oil prices, by both oil companies and the Administration, is that it is due to traditional market forces.

The other comment that I want to make is that Shell, like all other companies today, is an international company. I think one has to be a bit suspect when an oil executive talks about the U.S. national interests. The fact of the matter is that oil companies today are beholden to their shareholders. And their shareholders are around the world. And therefore, they don't necessarily have national interests of the United States at heart. Related to that, we asked the Ambassador about the future of nation states and said that he doesn't see the nation state disappearing in the next 30 years or so. For sure, nation states are going to exist.

I think our legal system is going to change dramatically. Not just because of oil companies, but of all companies. I mean, Citicorp today is 8 percent owned by the Chinese. We need a different system of regulation, clearly. I am an accountant. We see this in the accounting area. Right now, we have U.S. Accounting Standards. Within five years, there will be no such thing as U.S. Accounting Standards. It will be International Accounting Standards.

AUDIENCE: I am Fred Pfeiffer. I am a professional engineer. I have been in the water business all of my life. But there are a lot of parallels. One of

the things I thought was very important from last night's presentation was very simple: we need a short range, medium range, and long range planning and put into effect. When you think about energy, we have talked about oil, oil, oil, and coal. But nuclear power, power from the sun, General Motors is going to make a heck of a push to bring back the plug-in cars they tried in California a decade ago. The battery, the development of the proper batteries, or a process of batteries that will work is going to mean a big transformation in energy, and utilization.

What happens if this is successful? I hope it is. There is a lot of hope in this, because we are relying on technology that isn't available now. In the short range, we are still going to have to rely on petroleum. Medium range, let's say these things become successful. For every action, there is a reaction. How do we fund our highways? It is by the gasoline tax. What happens if there is no gasoline? What happens if we are plugging it in? So that is where all of this planning is so complex, and the whole infrastructure has to change also.

DR. MEDLOCK: One comment about the electric vehicle. The first generation electric vehicle really didn't gain a lot of traction, because they were really limited. As Americans, we like our freedom to be able to do whatever we want to do, whenever we want to do it. When you think about a plug-in vehicle, you have to plug it in. It has to have a full charge and then you maybe get 125-mile range. That means if you want to drive from Houston to Austin, you pretty much can't do it.

One of the next generation plug-in vehicles is a plug-in hybrid. You plug it in and get about 125-mile range on the electric battery. But then if you run out of charge, there is a gasoline internal combustion engine that you start to use. So you actually get tremendous benefit in terms of fuel efficiency. Most of us don't drive in a given day more than 125 miles, so most of the time, we wouldn't be consuming gasoline. Beyond that though, if you wanted to take that road trip with the family or something like that, we would still be able to do in the same vehicle that we drive around every day.

You bring up a good point though, about gasoline taxes and funding highway construction and maintenance. I would imagine that in a situation where we went more heavily to plug-in hybrids, the electric grid is going to have to change too. You would have to have a tax that was basically rolled in to the utility bills that you pay, in effect, to fund construction of roads and highways and things of that nature.

AUDIENCE: Tom Palaima from Austin, Texas. I want to touch upon matters that have been raised by almost everyone who has spoken this morning and also to your point. With Mr. Hofmeister's talk last night, I want you to comment on the actual end benefit, for let's call it the average American doing what he says we do, given that we are operating with transnational corporations, with prices set for gasoline and oil interna-

tionally, not nationally, with the level of indebtedness. The weak dollar is simply a sign of the poor state of the American economy. I asked that question of the Ambassador, and I asked it last night. No one wants to address the fact that we are something like seven trillion in debt.

So let's say we embark upon a plan where the Government says they will invest three trillion in research dedicated to this petroleum company. It takes these resources out. Is it going to charge a price for these barrels of oil that is less than the international rate, given that it is beholden to its shareholders? In other words, the end game of this, just as with the end game of our role in the international economy, is to spend. To me, it seems to be something very opposite from what is being put forward.

I have a second issue. I write columns for the Austin American *Statesman*. Therefore, I look into a lot of different things. I have been doing this for nine years. I have a 12-year-old son. We are trying to look to the future. And there are things that just need to be done. The point is that political leaders cannot propose things that need to be done, because the voters would, I mean, this is total denial of responsibility. I came of age during the Kennedy-Nixon debate. And I remember that speech: "ask not what your country can do for you, but what you can do for your country."

So what happened to people, to elected leaders who would say, yes, this is going to be difficult, but maybe we can even do it incrementally. There is no need to jump up from \$2.50 to \$7 in gas tax. But we are going to put in motion 50 cents this year, 50 cents next year, 50 cents the next year. Also devise it in such a way that would give you time to see how it is playing out, what people in our society are being most harmed by this, and develop this now forbidden word, social programs. The whole idea of a social democracy, which is what they have in Europe. I just lived in Spain for six months, I would go back there tomorrow, both for the intellectual atmosphere, the sense of responsibility by governmental leaders, the attention paid to the average human being in a society. These are things that really concern me.

The third point I wanted to raise is this matter of our being an example to the world. The Ambassador raised it yesterday. If we have a Katrina, we are a third world country. So what are we doing, holding ourselves up to a high standard? Well, the same applies in the area of energy. Somebody living in Spain can look at the United States and say we have no appreciable mass transit. We have the technology for energy efficient vehicles, but Ford Motor Company and GM design the SUV.

There was no common American sitting around in his house saying, "Gee, I want to drive a gas-guzzling car of monstrous proportion that will give a tremendous tax break to the manufacturers and create a windfall of profit for their shareholders." That was an appetite created by the industry. So if you are going to be a model, in terms of energy use, mass transit, railroads. Remember, we had the plan here about 15 years ago for a bullet train that was supposed to run from Dallas to Austin to San Antonio to Houston to College Station and back up to Dallas. It was a

wonderful idea. If you have traveled in Europe on trains, you know what a wonderful thing this is. And you can have trunk lines going out from there. But why was this shot down? Who was against it? Southwest Airlines. American Airlines.

What kind of role model can we really be? What is the ultimate effect of Hofmeister's plan? Why can't elected officials say this is what is good for the future of our country? And this has to be done. It can be done in a reasonable and intelligent way over a six-year-term or over two presidential periods, an eight-year-term.

We are going to watch out and protect the people in our society who are now seriously being neglected because this so-called thriving economy, from my point of view is a thriving economy for shareholders. But is not a thriving economy for the former industrial workers in Cleveland and Youngstown and Detroit and Pittsburgh? The poverty level in Cleveland, Ohio is 40 percent. Forty percent. We are a third world country in what we do to people living in those conditions. And none of this makes sense to me. Maybe you can make some sense out of it.

DR. MEDLOCK: You actually raise a lot of issues in your questions.

AUDIENCE: Of the three named, Hofmeister's plan is really the one I want you to address.

DR. MEDLOCK: Right.

AUDIENCE: If you do this, what is the end result for the common American?

DR. MEDLOCK: Well, you have to remember, Hofmeister's principal interest within Shell is North America. So he is concerned about Shell North America. So what does he see, when he sees investment opportunities for Shell North America? He sees those dwindling. In the interest of his company, within Shell, he is concerned about investment opportunities. And one of the ways you enhance your investment opportunities and the profitability of Shell North America is by lobbying for access restrictions to be removed on drilling.

So there really is a very commercial slant to what he is saying. And quite frankly, I think if any one of us was in his shoes, and we were beholden to our own shareholders, we would probably be doing the same thing. Now whether or not that is necessarily in the best interests of society as a whole, that is another issue. But that quite frankly, is one of the beauties of market economies. You have a lot of different self-interests that compete. And that competition is what ends up in resulting a welfare-maximizing end game, if you will. He is not going to be successful in lobbying for the guy in Virginia. You can drill off the coast of Virginia, just because there might be some oil and gas out there. That is just not going to happen.

The only way he will ever be successful in that, is if the price of oil goes

up to \$150 a barrel, and the price of natural gas is \$14 an NCF. Then the guy starts to feel it in his heating and electricity bills, and when he fills up his car, and says, well, maybe that makes some sense. You know, there is a price for everything. But even then, we have to go through the political process in lifting those restrictions, et cetera. That can be problematic in the sense that ultimately, you are thinking about access restrictions as a short run goal. It can very quickly become a medium term goal. And really, that means that the only thing that you and I and anybody else has at their disposal that is truly a short run goal is conservation. So you have to look at your own habits. One of the ways that we are forced to look at our own habits is by looking at the price at the pump when we are filling up our tank. That sort of thing will make us adjust our behaviors.

In terms of the comment that was made earlier, actually Wally made it to me earlier, too, about Hofmeister's message about a short term, a medium term and a long term policy. There is something in that, actually. Whether or not you agree with everything else he said. And it speaks to the issue of diversification. Yet again, when you design a policy, the policy has to be diverse. It has to recognize that there are goals that might not necessarily be consistent. But there are short term goals. There are medium term goals. And there are long term goals.

If I told you we had a tax on gasoline and that was a short term goal to alter consumption behavior in the medium term, and encourage conservation. Well, if you have conservation, if you have improvements in efficiency that are realized because people start to demand more fuel efficient vehicles, well, that actually has ramifications for global oil prices.

To give you an idea of the way the global oil market moves, people look at China, and they look at India, and they see these emerging economies. You have all heard the talk in Washington about how Chinese growth is really driving what is happening with oil prices. Well, I am going to tell you that is just a load. To give you an idea why, of all the road transportation fuel in the world that is consumed on a daily basis, an annual basis, whatever time frame you want to put on it, we consume 33 percent of it in this country. That is a massive number for 300 million people to do. Really it is only 200 million people when you think about the people who are driving. Thirty-three percent of the world's road transportation fuel. China consumes five percent. So what *we* do drives the global oil markets.

Our percentage of growth rate and demand is not as high as what it is in China. That is certainly true. But two percent growth on a massive base is a change in demand that is every bit as big as ten percent growth on a very small base. So you have to think about that, when you think about designing policy, and who you point a finger at.

Because I can promise you, no matter how much we want to point the finger across the Pacific Ocean, we are not going to change their behavior. Everybody in China wants to achieve the kind of wealth and the standards of living that we enjoy here. So we really need to think about how we can alter what we do to effect the changes that we want to effect.

AUDIENCE: Well, I just want to come back to some things that others have said. Because I was a little unsatisfied by some of your response, which seemed narrower than what they may have been talking about. I am Louise Weinberg of Austin, Texas.

In particular, as far as government raising the price of gas through tax at the pump, I am not clear that that is the best way to raise the price. But suppose the government did that. It is not just a question of affecting consumer behavior. It is a question, as someone else has said, of funding alternatives, particularly right now in research. But I would raise the important alternative, not so much of bullet trains, but of restoring rail in a true sense; high speed rail.

My parents remember a time when you could go from one major city in America to another major city in America. Each major city in America was surrounded by a network of tiny little railways, which would carry you out to every small town in America. And every small town had its railway station. The big cities had beautiful railway stations.

And longer travel was accompanied by sleeping cars, beautiful dining cars and other amenities. The railway stations had porters, and every facility you needed; newspaper stands, cafes, florist shops. This travel was elegant, secure and friendly and often attractive enough to be adequate for our needs. Now it was terribly slow by modern standards, but a high speed network of trains could do much to ameliorate that slowness. And the interesting thing is, European countries are way ahead of us on this. They are installing close high speed networks all over their lands; anticipating the oil crunch.

Nothing could be more civilized, or a more wonderful way to conduct one's transit. Particularly these days since air travel has become incredibly cumbersome and difficult. We would have to add security to the rail network, because of the problem of sabotage and terrorism, which would continue to plague us. That would be expensive.

It seems to me, it is not soon enough to get to work on our high speed network. If we are going to do this, we can't do it in America at large, but maybe we can start thinking about doing it in Texas. If we have to raise taxes, perhaps it is about time, our leaders started educating our people as to the value of public goods. It is not as useful to have a dollar in your pocket as for the Government to have enough to build a high speed network of rail. All you can buy with a dollar in your pocket is another tube of toothpaste. And that just won't get you to town.

The second point I wanted to raise: it is a mistake to underestimate our enemies. You made the remark that it is the poor, sad, underdeveloped third world from which the terrorism is emerging. I don't think that is quite true. There are a lot of people in Saudi Arabia, no doubt, who are incredibly poor. But on the other hand, there is tremendous development in Saudi Arabia. Giant modern cities raised in the desert with luxurious malls, cars everywhere. People are living an elegant, luxurious life on our dime.

If you look at the terrorists that bombed the World Trade Center, they were upper class Saudis and Egyptians who had been to University. If you look at the terrorists who bombed London and Madrid, they were home-grown people. Our 9-11 terrorists came from Hamburg, by way of Hamburg. They are educated jet setters. They were not underdeveloped people without the wherewithal. They were not in despair, and they were not hopeless. What they had is an ideology that is fundamentally opposed to American values. That somehow or other will have to be dealt with, as some of our speakers pointed out yesterday. So I do think it is a mistake.

It is part of what Steve was saying that if we tax at the pump, a large part of the price of oil at the pump will come to us instead of being delivered over to the Middle East from which the terror is arising. In other words, that tax would be delivered it into the hands of our enemies. And that is an important feature of raising the tax at the pump now.

DR. MEDLOCK: I guess a couple of things, in response to what you said, I will start with the second one first. Yes, it is definitely true that in a lot of these terrorist organizations, terror cells, there are very well educated people at the very highest levels of these organizations. But they do not go to colleges and universities to recruit their following. As a matter of fact, if you want to just look no farther than the Israeli-Palestinian conflict, just a few years ago, you could have drawn a line in terms of economic wealth between the average Israeli and the average Palestinian, just based on their ethnicity. The average Israeli had an average income of about \$31,000 per year; the average Palestinian about \$2,000.

AUDIENCE: May I respond to that?

DR. MEDLOCK: Yes. Absolutely.

AUDIENCE: What would happen if average Palestinian had the identical income as the average Israeli; if they had built instead of terrorized? They went for war and terror while the Israelis were building cities, schools and farms, and that made an infrastructure. They had the civil society, with courts and the rule of law, while the Palestinians were importing arms, building tunnels, educating their babies to be suicide bombers, filling their books with hate literature, and their schools, funding Madras.

DR. MEDLOCK: Well, we are going to have to agree to disagree on this one, because there is lots of evidence otherwise.

AUDIENCE: Saudis have funded Madras all over the world, teaching hatred, and radicalized the Palestinians, preventing the Palestinians further from developing the infrastructure, the rule of law, the peaceful values which are required to have a high income in a developing state.

DR. MEDLOCK: We are going to have to agree to disagree on this.

AUDIENCE: I don't think so. I think these are facts.

DR. MEDLOCK: You and I will have to on this issue.

AUDIENCE: I think these are facts well known to everyone.

DR. MEDLOCK: There is a lot of evidence with regard to the way the Israelis actually handled the potential development for Palestinian settlements.

AUDIENCE: Palestinians are Arabs, Arabs are citizens of Israel. They go to Israeli universities and they prosper. Palestinians on the West Bank in Gaza do not prosper because they have been engaged in terror rather than state building. Israelis are wonderful people with American style values. It is demeaning to them to think that if they had the rule of law, that their attendance at the University would not have come to something. We have to respect them, and realize that they are capable of a civil society if they have taken the trouble to build one.

DR. MEDLOCK: Of course. Well, we are just going to have to agree to end there, with that. One comment I will say about gasoline taxes just briefly. If instituted, and this is largely what happens in Europe, with regard to public infrastructure, you could use it. Even if it is phased in, you could use it to begin to fund the development of public infrastructure that would facilitate mass transportation. You could start in the low income areas, so that the gasoline tax wouldn't necessarily be perceived as regressive. There is a lot of opposition to doing something like that; it might be perceived as a regressive tax.

AUDIENCE: I am Boone Powell, and I have kind of an observation, maybe a little promotional bit for our next year's conference in San Antonio on architecture in Texas. As I understand the numbers, this is rough, transportation takes about 25 percent of our energy, and buildings take about 50 percent of our energy. I think most of our discussion typically centers on transportation.

We are working on programs, and talking about things with engineers, with code officials, in situations where we might, and it is not inconceivable at all, save 50 percent of the energy that we use in buildings. That would be equal to the entire energy budget for transportation. It seems to me that we haven't talked quite enough about other things aside from transportation and cars.

DR. MEDLOCK: I agree wholeheartedly. As a matter of fact, a lot of the energy savings that was achieved in the U.S. post oil shocks of the '70s came about because there were changes in commercial building standards

and commercial building codes, improvements in insulation, things like that. There is lots that could still be done there. But I think we talk about transportation because it is sort of the lowest-hanging fruit, if you will, on the tree.

AUDIENCE: I am Bill Wright from Abilene. I would like to make a couple of observations, and ask two questions. The observation: I just got back from Vietnam and all I saw were bicycles. And very fit people. So there might be a blessing in all of this somewhere.

Another observation, you mentioned the transfer of technology to support the cleansing of emissions and so forth and our ability to develop it and get it too far. You know, China has a vast reservoir of American dollars. So why don't they pay for it? The reason is, of course, because they are not committed to it. And they have other issues. But you can comment on that.

I want to pick up on what Boone said. Petroleum is a fuel that enables transportation. It's hard to run a jet airliner on coal. But the most potent political lobby in this country with regard to petroleum products is the home-heating fuel industry in New England and on the East Coast. They have effectively, in my opinion, been the major instrument of control for political decisions regarding petroleum products in the United States, at least at the retail level.

The other question I have is as an economist, what is your view about the effect if the Saudis and the other OPEC countries decided to use the euro as the reserve currency instead of the dollar?

DR. MEDLOCK: That is a very good question. That last one. Let me start with your first observation about Vietnam. My wife is Dutch and we spend time in the Netherlands visiting family. There is no such thing as urban sprawl. There is a very well developed mass transit system, and everybody rides bicycles. But one of the things that we have here that really prevents people from riding bicycles is urban sprawl. You have to ask yourself, well, what caused urban sprawl. Well, one of the contributing factors, low fuel prices.

It didn't take much for you to run away from the high real estate values that were inside the loop so to speak in Houston, and move out to Katy or The Woodlands or Kingwood or something like that, because quite frankly, it is very cheap for you to get to work, because you have car. So that is one of the things that higher fuel prices do, is actually discourage urban sprawl, because it is expensive to get from Point A to Point B.

On the euro-dollar exchange rate, there has been a lot of discussion about denominating barrels in euros instead of dollars. And a lot of that discussion has really started to pop up because the dollar has been weakening in international exchange markets.

So you have to think about it from the standpoint of the Saudis. They import over half of all the goods that they import from the European

Union. So if they are getting dollars for the barrels that they sell, and the dollar is weakening, then their purchasing power is in effect, going down. They have every legitimate reason to start to want to sell, or nominate contracts in euros rather than dollars. This would in effect, lower the demand for the dollar in international markets, and any time you decrease demand for a given supply, unless somebody is out there soaking all these dollars up and putting them into their vaults, then the dollar would be valued quite substantially. So we are looking at a situation that wouldn't necessarily be in the best interest of the U.S. consumer.

However, it is not in the best interests of anybody else because the U.S. is still the largest consuming economy in the world. If the U.S. dollar goes in the tank, that affects lots of other countries export market. And then you have the issue of contagion that begins to crop up. You could have a global economic recession in that particular situation. So you have to be very careful, if you are the Saudis about abandoning the dollar as what you take your oil price to. For that reason, actually, I don't think it is going to happen any time soon. Because I think they know that, too.

AUDIENCE: Sam Moore, El Paso. I have two what-if questions for the Baker Institute. Has the Baker Institute conducted any what-if research projects on if we had gone into Afghanistan, and maintained and adequately supported operation there, and exercised restraint insofar as Saddam Hussein and Iraq were concerned, and let them be our proxy defense against Iran. That is number one what-if.

What if we as a nation devoted more time in public and political discourse to a Manhattan Project for such things as coal, nuclear and so on. And devote the same time to that that we presently devote to abortion, school prayer, Creationism and other matters.

DR. MEDLOCK: That is a good question. We have not actually engaged in a lot of research on either one of those fronts. You are sort of venturing outside the energy program with the latter question. It is a very good question, though.

You have to wonder, what is it we as Americans really care about? Why do we fight so vehemently about certain things when we ought to, at least in my view and it sounds like your view and most of the people in this room, be fighting about and for other things?

The question about Afghanistan and Iraq is actually a very interesting one. Because by some accounts, if we were currently in Iraq, Iraqi oil production could be higher than it is today, and you have a very different picture of global oil markets than you do right now. So people have asked the question, would we be better off if we had not gone into Iraq. It is a loaded question, because there are lots of and-thens that have to play out over the last several years. But we haven't actively looked at either one of those things.

AUDIENCE: Following a little bit on Stan's comment with regards to research. We haven't done enough research and development in the oil and gas industry, obviously. What technological inventions or discoveries, or additions to our oil and gas industry, do you want to see happen in the next two to three years? I would like three of four ideas, if you could come up with them.

DR. MEDLOCK: I will see what I can do. Technological innovation. I think the most recent, and probably the greatest innovation that came about in the last couple of decades was horizontal drilling. It allowed for much lower footprint. We didn't have to drill a bunch of vertical holes. We could actually go down and fish around and find the sweet spot just by drilling in one spot. So that is actually a very impressive cost-reducing innovation.

There is actually something that is being worked on at Rice University right now, in the Sciences and Engineering Department over in the nano-tech lab. Nanotechnology was the brainchild of Rick Smalley who was the Nobel Laureate at Rice University who recently passed away. But he was a visionary. He had lots of ideas for what applications nanotechnology could actually be used, and one of them was energy.

He really wanted to solve the world's energy problems. He envisioned more efficient solar panels through the use of nanotechnologies and more efficient means of transporting electricity through the development of a carbon nanotube wire that basically meant you didn't lose anything in terms of efficiency in transmission. So you could have very long wires, transmit power very long distances, and it would be almost as if you had the power plant in your backyard. That would be an incredible savings.

One of the other things that they have actually been experimenting with is downhole nanotechnology. Basically, the idea is, and forgive me if I don't give you all of the hard specifics, you could use nanofilaments to send down the wellbore, and enhance the frac procedures that are done inside the well, you could actually recover a greater amount of oil and gas from a particular reservoir. Right now we recover, by most accounts, between 35 and of 40 percent of the resource that is in the ground when we drill a well. What you are talking about, with this particular technology, increasing the amount of oil and gas you recover from the well from 35 to of 40 percent to upwards of 60 and 70 percent.

That would obviously drive down the costs of producing a barrel of oil. But it would also mean that we could revisit reservoirs we have long since capped. I think that is probably the most promising technology that is on the horizon, aside from just refining and enhancing what we do, in terms of 3D and 4D seismic, which is stuff that is always going on. It is a gradual process, and it is always improving. Something that could actually enhance or improve the amount of oil that we get out of any particular development is what I would like to see happen. And I think it is something that will happen within the next decade or so. From what I understand, they are pretty close to trying some of this stuff.

AUDIENCE: Betty Sue Flowers, Austin, Texas. One of the things you alluded to was that flat line, the fuel efficiency of the car fleet, which was largely achieved by raising CAFE standards. That was public policy in the '70s. I read somewhere, I just want to ask if it is true, if you believe that if we raised our CAFE standards to the European level of a 44 - 45 MPG, is it true that we would no longer be dependent on importing any oil from OPEC? In other words, would that wipe out the OPEC part of our oil imports?

DR. MEDLOCK: Absolutely not.

AUDIENCE: Okay. I had read that, and it seemed incredible to me.

DR. MEDLOCK: I think what was alluded to in that statement is the amount of oil that we actually import from OPEC nations, if you exclude Venezuela because remember Venezuela is an OPEC nation, is not that big a number. You could eliminate all the Middle East imports. But having said that, it doesn't mean that Middle Eastern tankers would stop flowing into U.S. ports because what happens, if you reduce total demand, is you push at the margins everywhere.

That most expensive barrel that is coming from say, Nigeria, that last barrel that is coming from Nigeria doesn't necessarily come to the U.S. And one of the cargos that is very cheap oil, it is coming from somewhere in the Middle East still does. That is the idea of a balanced portfolio, of being in a world market. Everything competes on the same sort of stage, so to speak. To actually achieve not importing any OPEC oil, you would have to eliminate Venezuela, Saudi Arabia.

AUDIENCE: Well, what about the Middle East? Could we not be dependent on the Middle East if we raised CAFE standards to 44?

DR. MEDLOCK: We would still be dependent on the Middle East, even if no barrel of oil actually flowed from the Middle East to the U.S. The world market would still be dependent on the Middle East. If you had a disruption in the Middle East, all the cargos that are flowing into the U.S., people would start bidding on them. So the price of oil globally would go up regardless.

AUDIENCE: I am Michael White from Austin. My question is for the Baker Institute more generally. You have started doing some studies and position papers, white papers, regarding eventual planning for when, as you proposed, and I think it was Dr. Harris' paper yesterday, the competition among energy source developments is the worst thing we can be doing if our balance portfolio is the model for proper energy development and consumption for the future. The question I have is about economic modeling, or organizational modeling. What kind of new regulatory structures

will we need to be thinking about, when in fact our energy consumption and utility organizations now are in some respects, in competition with one another, rather than being coordinated from one to the next?

And is there any kind of modeling or discussion that is taking place on that level? What do we need to be thinking about for the future in that regard, both nationally, I assume is the first question, but maybe internationally as well.

DR. MEDLOCK: In Dr. Harriss' talk yesterday, he alluded to bundling these potential energy technologies to provide electricity service. There is nothing regulatory or magic about that ultimately happening. In fact, if somebody deems that this is a marketable opportunity and something that could be done profitably, in today's landscape, the market would dictate that it would happen. So to use that as a sounding or a cry for some new regulation that requires these things to be bundled and then put into place, I don't think that needs to happen, quite frankly.

Now in terms of renewable portfolio standards, things like that are happening. Perhaps one of the ways that you allow that to be achieved, is you allow utilities and state regulatory agencies to bundle different forms of renewable power, rather than just go all wind or all something else, because a lot of this legislation, it calls for a particular portion of wind, or a particular portion of something. That really is limiting diversification to some extent, and could lead to a costly outcome.

In terms of new regulations, I guess it depends on who is making the investment in the alternative fuel. If it is the public utilities, and by most accounts, it probably ought to be; they are the ones who are guaranteed a rate of return on the investments they are making, so it is the safest bet for them, then nothing needs to change really. Unless you want to dig deeper into deregulation in general, and how different fuel commodities compete in a deregulated fuel and electricity environment. That is probably a bigger topic than we could address here. But in a deregulated environment, absent subsidies, a lot of these renewables simply don't win; they wouldn't get built.

As a matter of fact, in a deregulated environment, actually at a pretty significant cost, or up to a pretty significant level, natural gas is really the favorite fuel. It has a lot to do with the fact that you can build a natural gas plant between 18 and 24 months. You can have it dispatching power.

You can utilize combined cycle technologies, which are about 30 percent more efficient than older technologies, or technologies that are still deploying in coal facilities and gas turbines and fuel oil facilities, and things like that. So gas really does have a very prominent place, at least today, in a deregulated power market.

AUDIENCE: I am Van Robinson, Fort Davis. I am a petroleum engineer. My career was with DeGolyer and MacNaughton and Exxon. People have been crying wolf about running out of oil since at least, since 1919

when the Director of the United States Geological Survey said we would run out by 1926. More recently, Campbell said peak oil would be 1989. King Hubbard, of the famous Hubbard Curve said that world oil would reach peak oil in 1995. Defize said we reached peak oil two years ago. Well, looking at all the public available data, I tend to agree with Exxon, saying that peak oil will not be before 2030.

And with improvements in technology, I wouldn't be surprised if it is not until 2050. So fortunately, we have some lead time in phasing in these other forms of energy. But the bad news is, we are going to look back at \$3 gallon of gasoline as the good old days.

AUDIENCE: Tom Palaima. I just had a follow-up question, very brief, uncharacteristic of me. Very brief. Namely, if the market drives things, what incentive is there really to develop these alternatives that are going to prolong the oil. I mean, have you addressed that?

DR. MEDLOCK: I am not sure I understand your question.

AUDIENCE: If peak oil really isn't going to be until 2030, and if we kick in on saving measures, then it might not be until 2050. This gives us time to do this. But again, if what is driving everything is the profits being made by transnational corporations, oil companies, coal companies, what incentive is there to really develop a big replacement for them? Are the economics to their advantage?

DR. MEDLOCK: Yes. I do understand your question now. That is actually where government can play a very important role. The Department of Energy actually engages in some things that we might think of pie in the sky developments. But really, this is where their role is incredibly important. There is a lot of risk that will ever bear fruit. So no private enterprise is going to pick that up, because the risk simply is just too high. If the Department of Energy begins to develop that, and they get it to a point where it starts to look a little bit more promising, then that is where private enterprise can come in and basically take the ball.

So the DOE bears the up-front initial cost of the development of this technology, and then private enterprise companies like Shell, BP, Exxon-Mobil, they see something that looks promising that fits with their business model, something that could work in ten years. They will put some money into it. This actually happens now. A lot of the clean coal technology was initially worked on by the Department of Energy. It is a very good role actually that they fill.

AUDIENCE: I am Jack Blanton, Jr. from Houston. First, I wanted to make a comment. We have been talking about habits that have been created. It strikes me that we have to realize that Detroit has spent a lot of money convincing Americans that they need to drive big cars and big trucks. I am sure that you all have seen all these trucks going down the road pulling

9,000-pound trailers. We have to realize that it is going to take time for us to change our psyche, because so much money has been spent trying to tell us we need to drive big cars when we don't always need to.

My question is, as far as an economist, if we were to have a gas tax, let's say staged in at 50 cents a year, how much demand needs to be taken out of the marketplace through this to create the price of oil to drop? Because as we know, it is only the last two percent of oil has a big effect, two percent of demand has a big effect on oil. In other words, if two percent comes out of the market, what will that do to the price?

DR. MEDLOCK: Well, it depends on where we are in terms of supply. The current market is very tight. What that means is there is very little spare capacity to speak of. Any sort of minor fluctuation and available supply or any minor fluctuation in demand is going to result in very big changes in price. Think back to your Econ 101 days, you have a downward-sloping demand curve, and you have a supply curve that is typically upward sloping. Right now, the supply curve is so steep that you can think of it as being vertical. So any movement in demand or movement in supply is going to result in a big change in price. So that sort of describes the market we live in today.

If you go back to say, the mid-'80s, where Saudi Arabia had lots of spare capacity on hand, then you weren't in a situation when you were on a vertical supply curve. It was basically a flat supply curve, and the vertical piece was out there somewhere in the distance. So we couldn't really see it; we didn't feel it. Demand fluctuations didn't matter. Iraq invades Kuwait, Saudi has spare capacity. They can pick up the slack. You really see only a minor blip in terms of what happened in oil markets. So that is the advantage of spare capacity. It is insurance to the consumer, so to speak.

How do we get there again? Well, we can get there either through massive growth in exploration and development, which is probably the least likely path. We could get there through a global economic recession, which is an unsavory path. Or we could get there through simply conservation. This is why I brought up the point about the U.S. being the largest consuming market in the world earlier. We really can have a massive impact. We did some calculations looking at gasoline prices in the U.S. and what really drives them and how we, as American consumers, can affect them.

First of all, it is the price of crude oil. You can use the price of crude oil to explain about 95 percent of the variation in gasoline price. If you are wondering why gasoline prices are going up, then all you have to do is look at the crude oil price. That will pretty much explain the majority of it. There are seasonal factors that alter the shape of that function, such as when you move into the summer driving season. Demand increases and markets can get tight. We don't have a lot of spare refining capacity, so gasoline prices will typically rise. When you move out of the summer driving season, gasoline prices will typically fall for a given level of oil prices.

One of the things that we did, in all of these exercises, we figured out

what is the effect of conservation on demand. One of the calculations we made was the following: this is a pie in the sky sort of thought, but if every individual could drive 35 miles a week less, so for most people, that is a daily commute to and from work, you could actually cut about 20 percent of road petroleum consumption in this country. That is every American that drives a car could do that. Obviously, not every American is going to do that. But if we could, what that means is, you basically put two million barrels a day of petroleum back onto the global market. That is spare capacity. That basically would have a massive impact on global petroleum product prices, global crude oil prices.

And you would be in a situation where the market simply wouldn't be tight. Conservation is a powerful weapon. It is a very powerful weapon and it is one that requires mass mobilization. So it is difficult to exercise that weapon, right. Or to use that weapon. But certainly, if every American consumer just adjusted their behavior accordingly, according to that sort of a magnitude, global oil prices would drop precipitously. Because you would have 2 million barrels a day of oil floating around there, without a home.

Who do you think feels that the most? It is the guy who can shut in capacity. It is the least cost producer. Typically, it is Saudi Arabia. They are the ones who are going to start to reel in the reins. OPEC will adjust production because they are going to try to keep price up.

So conservation really is a very powerful tool. The key is keeping those changes permanent. If we are going to adjust our behavior, it has to last. Because if it is just going to happen for say, three months out of the year, markets will realize that, and the forward price will price the risk of demand increasing yet again, right back into the market. The price of oil would go back up. And you wouldn't have much of an impact. So it has to be something that is permanent, lasting and really is an alteration of behavior.

By the way, the calculations I referred to, all that is available online. There are three pieces, actually. One is just a policy piece. Just what you are thinking that I wrote, that is published on the Baker Institute website, about gasoline prices. There is another one that is a gasoline FAQ that Amy and I put together, that is also available online that looks at various questions and sort of attempts to address those questions in a way to sort of understand how we can influence the price of gasoline, and influence demand. Then there is a technical paper that is behind all of that, that is also on the website on the Baker Institute website.

MRS. WILSON: I am going to say thank you very much, Ken. You were a wonderful moderator. And you have been a wonderful audience. Thank you for attending. It has been my pleasure to serve this year as President of the Philosophical Society of Texas.

MEMORIALS

THOMAS D. ANDERSON
1912-2007

Thomas Dunaway Anderson, a long time member of The Philosophical Society of Texas, died June 14, 2007 at his home in Houston. He was 95.

Tommy was a distinguished lawyer and a leader in several cultural organizations. Dr. Mavis Kelsey, a founder of the Kelsey-Seybold Clinics in Houston, said "He was role model for me, even though I was only four months younger." He also described Tommy as "extremely honest (and) one of the most steadfast people I know."

Tommy gave tremendous amounts of time to the Texas Medical Center among other projects. He was the nephew of Monroe D. Anderson, who was one of the founders of M.D. Anderson Cancer Center. His father, Frank Anderson, in 1904 co-founded Anderson, Clayton & Co., cotton merchants in Oklahoma City. Anderson Clayton moved to Houston in 1916 and by 1977 had operations in more than 49 nations before it later merged.

Anderson traced his family history to 1736, when his ancestor, William Anderson, settled in Maryland. He was born March 9, 1912, in Oklahoma City, the son of Frank Ervin Anderson and Burdine Clayton Anderson. In 1928 the family moved to Houston, where he attended Rice University and was a member of the marching band.

Anderson received his law degree in 1934 from Washington and Lee University and joined what later became the Andrews & Kurth law firm where he practiced law for 63 years before retiring in 1993. Tommy was a longtime president of the Protestant Episcopal Church Council of the Diocese of Texas and was a board member of the Episcopal Theological Seminary of the Southwest in Austin.

Anderson had a wide range of interests, including classical music, the Episcopal Church, science and medical institutions, and the preservation of historical buildings. He also collected antique cars, among them two Rolls-Royces and a Pierce-Arrow.

He and his wife, Helen Sharp Anderson, received the Ima Hogg Historic Achievement Award in 1997. In addition to his wife, survivors include his daughters, Helen Anderson Shaw of Chevy Chase, Md.; and Lucille Anderson Streeter of Washington, D.C.; a son, Justice John Sharp

Anderson of the 14th Texas Court of Appeals; and a brother, Benjamin Monroe Anderson, both of Houston.

A memorial service was held at St. John the Divine Episcopal Church, Houston.

I.B.W.

EDWARD N. BRANDT JR.

1933-2007

Our father earned three degrees from the University of Oklahoma, BS, MD and PhD and his Masters from OSU. He wrote and co-wrote many professional articles; his curriculum vitae runs to several pages. His long career began at the University of Oklahoma Health Sciences Center as Director of the Computer Center and then Assistant Dean of Medicine. He moved to Galveston, Texas to become Dean of the Graduate School and then Dean of Medicine at University of Texas Medical Branch. He was then promoted to be Vice-Chancellor for Health Affairs of the entire UT system.

In 1981, President Reagan appointed him to be the Assistant Secretary for Health in the Dept. of Health and Human Services where he oversaw the NIH, the CDC, the FDA, HRSA, ADAMHA, the Office of the Surgeon General and other agencies. It was during his tenure, that AIDS was first identified and he led the nation's health care agencies' response to the epidemic. As Assistant Secretary, he worked very hard on health issues for women, and is recognized for giving birth to efforts in the Public Health Service/DHHS for the future blossoming of Federal efforts on women's health across the entire Department of Health and Human Services that have resulted in the increased national consciousness about women's health and their healthcare, being called the "Godfather of women's health" for his efforts by Vivian Pinn, the Director of the Office of Research on Women's Health at the National Institutes of Health.

In 1985, he became the Chancellor of the University of Maryland at Baltimore, which included the schools of medicine, dentistry, nursing, pharmacy, social work and law. In 1989, he returned to his beloved University of Oklahoma as Dean of Medicine. After his tenure as Dean, he taught in the School of Public Health and was appointed Regents' Professor. He continued to teach after his official retirement, until his last illness prevented it. In that role, as in all of his roles, he was a mentor to many of his students and colleagues. Their fond recollections of his help and advice were a great comfort to him in his last days and a vivid testament to his caring and giving nature.

His awards and honors are too numerous to list. Several of the walls of his home are covered with them. He served on many Boards and Committees, including the Commonwealth Fund, the Robert Wood Johnson Foundation, the Kaiser Foundation, General Motors, the Oklahoma State

Medical Association, the American Medical Association, the Food and Drug Administration, other government agencies. He was a Member of the Institute of Medicine of the National Academy of Sciences.

He is survived by his beloved wife of fifty-four years, Patricia Ann Lawson Brandt. He was preceded in death by his mother, Myrtle Frances Brazil Lewis. He is also survived by his father, Edward N. Brandt, Sr. and his wife, and our beloved grandmother, Patricia; and by his sons, Patrick, Edward III and wife, Julie, Rex, Sr. and wife, Beth; grandchildren, Rex Carlin, Jr., Jeremy, Derek, Dagan, Karina, Justin and Kelli; and by his sister, Jennifer and her daughter, Renee, her husband, Peter, her child, Clifford; and by his brother, Carlin, and his wife, Helen, children, Kim and Chris, and his wife Jen, their children, Katy and Riley; many other nieces, cousins and other relatives. As anyone who knew him will know, he also leaves his beloved dogs, Suzie, Roxy and Buddy.

Edward N. Brandt III

WILLIAM CARRINGTON FINCH
1911-2007

William Carrington Finch, who served as the 11th president of Southwestern University, died June 13 in Nashville, Tenn. He was 97.

Finch served as president of Southwestern from 1949 to 1961, guiding the University through a difficult period of declining enrollment and revenue that followed the immediate post-war boom.

"When the Finch administration began, only two new buildings had been built in over 20 years....," Ralph Wood Jones wrote in his 1973 book on the history of Southwestern. "The campus was dotted with one- and two-story buildings brought in by the previous administration to accommodate the expanded post-World War II enrollment. Most of the campus roads were unpaved, the older buildings were badly in need of repair, and a protracted drought of the late forties and early fifties added dead and dying vegetation to the ramshackle scene."

During his tenure as president, Finch gave Southwestern a consistent sense of direction, focusing attention on the need for a strong and well-paid faculty, a selective student body and improved facilities. Buildings added to campus during the Finch administration include the Lois Perkins Chapel (Finch conceived the ideas for the stained glass windows on the sides of the chapel), the Fondren Science Building, Ruter Hall, the Alma Thomas Theater and Fine Arts Center, the Kurth-Landrum Golf Course, and the four fraternities on Fraternity Row. In the 1952-53 academic year, Finch made the decision to end football at Southwestern due to rising deficits in the athletics budget. He later recommended that Southwestern eliminate its graduate program and its summer school program. He also created Southwestern's first significant working endowment.

During the Finch administration, Southwestern also took its first steps toward racial integration by scheduling regular athletic, cultural and religious events that included students of color. Finch also took the first steps to prepare Southwestern for integration that would come in the 1960s.

Bill Finch's administration at Southwestern still has profound impact more than 50 years later, and for the faculty, staff and students who had the great honor of knowing him personally, his positive influence will endure. We owe him our deepest gratitude for setting Southwestern on a path that led first to stability, then to a period of refocusing, and finally to a realization of the core principles of being a church-related liberal arts college.

A native of Chase City, Va., Finch received his undergraduate degree from Hampden-Sydney College in 1929, a master's degree from Union Theological Seminary in 1936 and a Ph.D. from Drew University in 1940. His life was spent in education, teaching first at Oklahoma City University and moving to Southwestern University in 1941 as an associate professor and head of the Department of Religion and Philosophy.

In 1944, he joined the U.S. Navy as chaplain, and served in the Pacific theater on the U.S.S. Bingham until his discharge. After the war, former Southwestern President John Score appointed Finch to serve as his administrative assistant—a position that helped prepare him to assume the presidency three years later when Score died of a heart attack.

Finch left Southwestern in 1961 to become Dean of Vanderbilt Divinity School, where he served for four years before going to Emory and Henry College in Emory, Va., as president. He retired in 1971 and returned to Nashville, where he spent a good many years in volunteer work with the Store Front Ministry and other services.

Finch is survived by his wife of nearly 70 years, Lucy Bedinger Finch, and two sons, Dr. William Tyree Finch of Nashville, and Dr. Richard Carrington Finch '65 of Cookeville. He also is survived by four grandchildren, two nieces, two nephews, and seven great nieces and nephews.

At a memorial service held for Finch in Nashville, friends and family remembered Finch for his quiet demeanor, his wry sense of humor, his compassion for people, his delight in reading and his love of nature.

J.B.S.

LAWRENCE DURWOOD FLEMING

1914-2007

Durwood was born in Sulphur Springs, Texas on August 9, 1914. He died in Dallas, Texas on January 22, 2007.

Dad was the oldest of six children of the Reverend and Mrs. (Lucile Rash) John Payne Fleming. Durwood graduated from Southern Methodist University (Bachelor of Arts) and The Perkins School of Theol-

ogy—SMU (Master of Theology). He pursued his doctoral studies at The Union Theological Seminary in New York. He held Doctorates—*honoris causa*—in Divinity, Law, Letters and Humanities from McMurry College, Texas Wesleyan University, Southwestern University and Oklahoma City University.

He was the founding pastor of St. Luke's United Methodist Church in Houston serving that congregation from 1945 to 1961. In 1961, he was elected the twelfth President of Southwestern University, then Chancellor then President Emeritus. His accomplishments in leading these two great institutions in the mid 20th Century are stuff of Texas and Methodist lore.

Elected to its membership in 1970, he was later President of *The Philosophical Society of Texas* (1980). He was a member of the Kappa Alpha Order.

Throughout his adult life, he maintained a vital relationship with Southern Methodist University—being named *Distinguished Alumnus* in 1965. For many years after his retirement, he was an enthusiastic participant in the affairs of Highland Park United Methodist Church in Dallas where he began his active ministry in 1936 as a student associate minister.

Dad was participant in over thirty boards and agencies during his active ministry and university presidency-chancellorship. These foci spanned an amazing expression of human compassion and service throughout the purview of the Church, Higher Education and Healthcare. At one time or another, he sat on the executive committee(s) or chaired nearly all of them.

Believing in the essential nature of organization and varying viewpoints to nurture great causes, he was many times a delegate to the Jurisdictional and General Conferences of the United Methodist Church. He was a delegate to the World Methodist Council five times. His participation in conferences and councils began as a young Delegate to the Conference on Faith and Order held at Oxford, England in the summer of 1937 and continued throughout his active professional lifetime.

As I think on his remarkable life, several focal points are fixed in memory. They are bright evocations of three intertwined lives: Faith, Love of Learning and Friends-Family.

Dad was a man of enormous and abiding faith in the certainty of God's profound acts in the creation, sustaining and ultimate salvation of the world. He thought and spoke of these in the idioms of 20th Century protestant Christianity but was intellectually at home in all the great Religions of the world. His faith was not worn as an adornment but quite simply as who he was. He not only preached this faith, he lived it.

He adored the life of learning. He was by nature intellectually curious. He was gifted with the ability to "infect" others with what he called "the contagion of education." His enthusiasms and dreams were largely recognized and confirmed in his distinguished presidency of Southwestern University.

He was a great and loving husband to Mother and a great and loving father and father-in-law to my two sisters, me and our spouses. If it's pos-

sible, he was an even greater Grandfather to his ten grandchildren and then his fourteen great grandchildren.

He was a lover of people who regularly took the part of all manner of causes and high emprise having to do with life and its various circumstances.

He is presently missed by friends and family. But, even when that "missing" shall cease through the long view of time, the good that he did on behalf of us all (and all those to come) will remain a constant ingredient for right and good for so long as our world lives.

J.H.F.

NORMAN HACKERMAN

1912-2007

On June 16, 2007, Dr. Norman Hackerman, scientist and academic leader, was lost to Texas, the nation, and the world. In a career spanning eight decades, he exerted extraordinary influence as a scientist at the bench, as a teacher in the classroom and in the laboratory, as president of two universities, as a guiding figure of a prominent foundation, and as an advisor in the halls of government.

Norman Hackerman was a native of Baltimore, where he was born on March 2, 1912. He was educated there through his Ph.D. in chemistry, earned at Johns Hopkins University in 1935. He became an authority on electrochemical processes, especially those connected with metallic corrosion. During the Second World War, he worked on the Manhattan Project.

In 1945, he joined the chemistry faculty of The University of Texas, which he chaired and developed through most of the 1950s. Succeeding through several higher posts, Dr. Hackerman became President of the University of Texas in 1967 and provided strong leadership during a period of exceptional growth in the University's academic standing, national presence, and size.

In 1970, he was named President of Rice University, which he led for the subsequent 15 years. The Hackerman era saw great increases in Rice's scope and strength, and the last year was marked by induction of Rice University into the Association of American Universities.

From 1982 until 2006, Dr. Hackerman chaired the distinguished Scientific Advisory Board of the Robert A. Welch Foundation, which oversees the Foundation's extensive grantmaking in chemistry.

Throughout his career, he was an important advisor on science and science policy to industry and government. Dr. Hackerman served for more than a decade on the National Science Board and chaired it for a time. He was honored with the top federal awards for scientific leadership: the Vannevar Bush Award of the National Science Foundation and the National Medal of Science from the President. He was a member of the National Academy of Sciences.

Norman Hackerman very likely did more than any person to establish Texas as a center of internationally competitive scientific capability. He was a wise leader, a committed teacher, a consistent believer in the value of scientific truth, and an exceptional colleague.

L.R. F.

WILLIAM C. HARVIN, III
1919-2007

William C. Harvin, III was a loving and involved husband and father, talented attorney, churchman, civic leader, and mentor. After losing his father at an early age, he was raised by his mother in Houston, where he was a champion debater and extemporaneous speaker at San Jacinto High School. Having worked summers at the law firm of Baker Botts as a messenger, he developed an interest in law and aspired to become a lawyer.

While attending college at the University of Texas, Mr. Harvin met Ruth Helen Beck, who he married in 1942. Upon the outbreak of World War II, he became an officer in the Navy and served first on the battleship *New Mexico* in the North Atlantic and later as a naval aviator. After the war, he attended law school at the University of Texas, where he was an editor of the *Texas Law Review*, and upon graduation in 1947, joined Baker Botts.

Mr. Harvin was universally admired as a great lawyer and was highly respected by his colleagues, including his adversaries. He was the prototypical big case trial lawyer, exhibiting great trial skills coupled with intelligence and the strategic judgment to effectively handle complex cases. As a result of his legal prowess, he was elected to both the American College of Trial Lawyers and the American Law Institute.

From 1972 until his retirement in 1984, Mr. Harvin served as the Managing Partner of Baker Botts. During his tenure as Managing Partner, the firm opened its first offices outside Houston, embraced new technology, aligned advancement with merit, and more than doubled in size. He shaped the future of Baker Botts by holding to core values, while making changes essential to assure the firm's future.

Mr. Harvin was widely recognized for his devotion to community service. He personified the ideals of citizenship and community involvement. In the field of education he served as a trustee of St. John's School, a member of the Board of Visitors of the University of Houston, and a director of the San Jacinto History Museum.

He had a special interest in the Houston medical community, where he was a long time trustee and Vice-Chairman of the Board of St. Luke's Episcopal Hospital, Chairman of the Board of the Kelsey Research Foundation, and Chairman of the Board of the Texas Medical Center. In 1996, "William C. Harvin Boulevard" in the Texas Medical Center was named in his honor in recognition of his contributions to the medical community.

Mr. Harvin was also a loyal supporter of the University of Texas, having served as a member of the Dean's Council of the Law School, Chancellor's Council of the University of Texas System, President's Council of M.D. Anderson Cancer Center, the Development Board of UT-Houston Health Science Center, and as a Life Member of the Ex-Students' Association. In 1987, the University of Texas honored him with its Distinguished Alumnus Award. Mr. Harvin and his family later endowed a scholarship to enable a needy Houston student to attend the University of Texas Law School.

As an active member of the Episcopal Church, Mr. Harvin served as a vestryman and senior warden of both Palmer Memorial Episcopal Church and St. Martin's Episcopal Church. He also served the Diocese of Texas as trustee of St. Luke's Hospital and the Episcopal Theological Seminary of the Southwest. In 2002, St. Martin's honored his long service by bestowing its "Star" Award upon him.

Mr. Harvin was a warm and gracious man who touched the lives of many. His impact on the Houston community was recognized by his being awarded the Brotherhood Award of the National Conference of Christians and Jews and the Houston Bar Auxiliary's Leon Jaworski Award. He will be long remembered for his incisive intellect and thoughtful decisiveness, which was always tempered by his sensitivity to the concerns of others.

Mr. Harvin adored his family and they, in turn, loved and respected him. He is survived by his beloved wife, Helen, his children, David Tarleton Harvin and wife Sally, Susan Harvin Lawhon, and Andrew Richard Harvin and wife Lyl, seven grandchildren and two great-grandchildren.

R.C.

JOHN LUKE HILL

1923-2007

John Luke Hill was a giant of Texas law. His service as Chief Justice was only one of many milestones. But whether as a remarkably successful plaintiff's attorney, an innovative Secretary of State, a crusading Attorney General, a senior partner in three of Texas' most prominent law firms, or a private citizen advocating for better courts, John Hill was a force of nature in Texas law for half a century.

I don't think John Hill's boyhood dream was to be Chief Justice. Instead, his magnetic personality, his leadership skills, and his powers of persuasion made him a natural for politics, and all the smart folks pegged him early as a future Governor. After the voters twice failed to do their part, however, John looked for other ways to serve the State he loved. John always credited his former partner, Jim Kronzer, with first suggesting that he would be a great Chief Justice if the job ever became available. It did, rather unexpectedly, when Judge Greenhill resigned and Judge Pope, his appointed replacement, declined to seek a full term.

The new chief tackled his new role with characteristic energy and zeal. After proposing sweeping docket management reforms for the state's trial

courts--surely there are a few old timers here who remember Dean Ernie Friesen--John became the state's premier cheerleader for judicial selection reform. He stumped the State to decry the evils of partisan politics in the judiciary, and created a Committee of 100 to push for merit selection. His old friends and allies at the Texas Trial Lawyers Association gave him a mock award, the name of which I can't repeat in polite company, and five justices on his own Court countered with a "Committee of 250" to defend the status quo. After less than three years on the Court, Hill announced his retirement, saying he wanted to devote more time to getting politics out of the Courts.

Many greeted this explanation with skepticism, or even derision. But John Hill confounded his doubters, spending the next two decades crusading forcefully and enthusiastically for better courts. He created 501C(3) corporations, wrote op-eds, lectured bar groups, buttonholed legislators, and even appeared twice on *60 Minutes*. He never lost hope, and never lost heart. "This year," he would say, "I really feel it. The people will demand change for Texas."

In working with John on this issue, I saw the essence of the man--passionate, persuasive, energetic, inventive, not a little stubborn, but above all optimistic. His vision was always fixed on the future. Eighty is the new sixty, he told me on perhaps the only occasion when I ever dared suggest that a certain task might be better left to someone of a younger generation.

John was a mentor, a friend, and a role model, and Lyn and I still miss him every day. His wise counsel helped me immeasurably as I navigated the minefields of a hostile legislature, a skeptical judiciary, and a proud assemblage of regional and local judicial administrators. He was never too busy or too distracted to help me whenever I asked.

But I was not the only one who John took under his wing. He loved being a mentor to young people, from his bright assistant attorneys general to his law clerks to young associates. But above all, he especially loved and treasured his family -- Bitsy, his children Melinda, Graham and Martha, and their spouses and children, counting as his best times when could gather with the clan at the "little Place" in Dripping Springs.

John frequently said that he longed for the day when no client would have to ask his lawyer, "How are you with the judge?" That day will surely come, and when it does, it will be the last, best tribute to the public career of John Luke Hill.

T.R.P.

CLAUDIA ALTA TAYLOR "LADY BIRD" JOHNSON

1912-2007

Wife, mother, grandmother and great grandmother, friend, conservationist, businesswoman, our Environmental First Lady. Lady Bird Johnson held claim to these titles and more. All of her life, Mrs. Johnson brought beauty to her sprawling family, to the Texas Hill Country she

loved and to the nation that loved her. A long-time, active member of the Philosophical Society, she was in the front row seat when we dedicated the 2001 program, *The Land*, in her honor for serving to inspire generations of citizens to love and value our native plant heritage.

Lady Bird Johnson's legacy lives on in the millions of blooms planted in the nation's capital, in the sweeping banks of wildflowers lining U.S. highways and in the charm of Austin's revitalized Lady Bird Lake, and in the environmental movement that she inspired. An equally lasting legacy is her extraordinary family—Lynda Johnson Robb and her husband, Chuck; Luci Baines Johnson and her husband, Ian Turpin; six granddaughters and one grandson; and 12 great-grandchildren.

The first lady was born Claudia Alta Taylor in the East Texas town of Karnack on December 22, 1912. Her father, Thomas Jefferson Taylor, owned a general store. Her mother, Minnie Patillo Taylor, died when Claudia was 5 years old, leaving her and her two brothers, Tommy and Tony, in the care of their father and their Aunt Effie. Legend has it that a nursemaid said Claudia was "as pretty as a lady bird" and so her nickname was born. Mrs. Johnson writes: "I grew up in the country—rather alone—and one of my favorite pastimes was to walk in the woods, exploring, particularly in the springtime, searching for the first wild violets and starry white blossoms of dogwood, feeling the crush of pine needles underfoot, the wind whispering overhead."

As one of Mrs. Johnson's friends said of her at a wildflower garden dedication in her name: "Mrs. Johnson tries to speak and write in prose, but it always comes out poetry"! And so it was all of her life. She authored two beautiful books: "A White House Diary" and "Wildflowers Across America" with Carlton Lees, both of which read like poetry. Transcripts of her countless speeches and personal letters are surely national treasures.

Mrs. Johnson was graduated from Marshall High School in 1928 and attended Saint Mary's Episcopal School for Girls in Dallas from 1928 to 1930. She then entered The University of Texas at Austin, graduating in 1933 with a bachelor of arts in History and in 1934 with a bachelor of Journalism with honors. Many years later, Mrs. Johnson was named a Distinguished Alumna of The University of Texas at Austin, and also served a six year term as a member of The University of Texas System Board of Regents.

On her own, Lady Bird Johnson was a successful businesswoman. In 1943, she bought a failing low-power, daytime-only Austin radio station with an inheritance from her mother. Armed with her journalism degree and a tireless work ethic, she took a hands-on ownership role, selling advertising, hiring staff and even cleaning floors. Her business grew to include radio and television stations, eventually becoming the LBJ Holding Company in which Mrs. Johnson was active well into her 80s.

She met the tall, ambitious man whom she would marry when he was a congressional secretary visiting Austin on official business. Lyndon Baines Johnson courted Lady Bird Taylor with all the single-minded energy he

later would bring to elected office. They were engaged just seven weeks after their first date and married in November 1934. Mrs. Johnson recalled that “sometimes Lyndon simply took your breath away.” She supported her husband’s political career, from running his congressional office while he was serving in World War II, to campaigning independently and courageously on a whistle-stop train throughout the South in 1964. During her five years as first lady, Mrs. Johnson led the effort to create the Project Head Start preschool program for children and she traveled the country to promote it. And it was as first lady that she was able to translate her love for the land into national policy.

From her years growing up in Karnack, her college years and early married life, Mrs. Johnson found comfort and joy in the natural world. As first lady, she built a lifetime of achievement as described in Lewis Gould’s book “Lady Bird Johnson: our Environmental First Lady”. As she wrote in “Wildflowers Across America”: “Because my heart had for so long been in the environment, I began to think that in the White House I might now have the means to repay something of the debt I owed nature for the enrichment provided from my childhood onward. And since hometown for the next few years was still to be Washington, D.C. where better to start than in ‘the nation’s front yard!’”?

Mrs. Johnson’s beautification and environmental efforts began flowing in a steady stream: the Committee for a More Beautiful Capital and all the azaleas, dogwoods, and acres of daffodils that followed; the Highway Beautification Act of 1965; the Surface Transportation and Uniform Relocation Assistance Act of 1987 that requires at least one-quarter of 1 percent of funds expended for landscaping projects in the highway system be used to plant native flowers, plants and trees. Mrs. Johnson was concerned about the term “beautification”, because she was promoting so much more—clean water, clean air, and preservation and restoration of native plants and landscapes, but at the time the term resonated. And still does.

The Johnson administration was recognized as the most active in conservation since Theodore Roosevelt, largely because of Mrs. Johnson’s support: the Wilderness Act of 1964, the Land and Water Conservation Fund, the Wild and Scenic Rivers Program and many additions to the National Park System.

With her return to Texas, Mrs. Johnson continued her efforts. She led the effort to establish the much loved trail around Town Lake, renamed Lady Bird Lake, in Austin. And she organized a 20 year program where she personally gave annual awards to highway district managers for the best wildflower and native plant displays in Texas. And on her 70th birthday, she and her friend Helen Hayes and many supporters founded the National Wildflower Research Center on 60 acres that she donated in East Austin.

Outgrowing that space, the Center moved to a site in southwest Austin and the buildings and gardens, with the largest rainwater reclamation system in the country at the time, opened its doors in 1995. In 1998,

the Board renamed it the Lady Bird Johnson Wildflower Center in honor of its founder and tireless worker on behalf of the environment. With Mrs. Johnson's encouragement and blessing, the Wildflower Center joined the University of Texas at Austin in 2006 and continues to flourish as a national education, research and information center about native plants and sustainable landscapes. Mrs. Johnson was actively engaged in the work of the Wildflower Center until she passed away July 11, 2007 and was laid to rest in the Johnson Family Cemetery on the banks of the Pedernales River.

Schools, buildings, and native plant gardens across the land are named for Mrs. Johnson and her honors are countless. In 1977, Gerald Ford awarded her the Presidential Medal of Freedom which states: "One of America's great first ladies, she claimed her own place in the hearts and history of the American people. . . Her leadership transformed the American landscape and preserved its natural beauty as a national treasure." For countless grateful Americans, Mrs. Johnson's legacy is a field of wildflowers on a spring day, the cool flowing stream in a park, the birds in the forest, and the sigh of the wind in the pine trees.

E.C.T.

HERBERT H. REYNOLDS

1930-2007

Baylor University President Emeritus Herbert H. Reynolds, the 11th president of Texas' oldest continuously operating university, died at the age of 77.

Upon receiving the news, Baylor President John M. Lilley stated, "I have known Herb for 50 years, first as Capt. Reynolds, one of my Air Force ROTC professors. During his 14-year presidency and the service he provided under President McCall, Herb made an extraordinary impact on Baylor University, creating a new governance structure and supporting a variety of new academic initiatives, student life opportunities and facilities. Herb was instrumental in establishing George W. Truett Theological Seminary at Baylor, whose campus is named for him and his great friend, John Baugh."

Reynolds was born March 20, 1930, in Frankston, Texas. He earned his bachelor's degree from Trinity University in 1952 and completed four years active duty in the U.S. Air Force. After service as a member of a technical advisory group to the Japanese Air Self Defense Force, he came to Baylor in 1956. In 1958, he completed his master's degree in psychology, followed by his doctorate in experimental psychology (neuroscience) and clinical psychology in 1961. During this time he also served as an assistant professor of aerospace studies and a teaching fellow in psychology. He remained on active duty in the Air Force during those years to prepare to join the faculty of the Air Force Academy.

Reynolds had been assigned to the faculty of the Air Force Academy in 1961, but he was diverted to the Aeromedical Research Laboratories at Alamogordo, N.M., where he became deputy commander and director of research. The laboratory was involved in unique research activities associated with the U.S. space program, specifically the Project Mercury, Gemini and Apollo NASA endeavors.

In the midst of producing some 50 publications, Reynolds also served as an adjunct faculty member of both Baylor and the University of New Mexico. After serving several months as the establishing commander and director of plans for the Air Force Human Resources Laboratory, he retired from the Air Force in 1968, at age 38, having completed 20 years of active duty with four decorations for meritorious service.

In 1969, Reynolds joined Baylor as executive vice president and, in 1981, became the university's 11th president. More than \$180 million in renovated and new facilities were added at Baylor during his presidency, endowment quadrupled, the total net assets of the university tripled and there was no increase in indebtedness.

In the first five years of his administration, there were a number of special academic initiatives, among them the establishment of the Distinguished Visiting Professors Program and the creation of the Robert Foster Cherry Great Teacher Awards, which provide recognition of some of the world's finest teachers and brings them to Baylor for specific teaching and lecture roles. Others included the designation of Baylor professors as Master Teachers, the highest honor granted to Baylor faculty members, which began under Reynolds in 1982; the designation of 12 Distinguished Professors and the creation of "In-Residence" faculty positions for faculty with unique talents and backgrounds.

During Reynolds' presidency, educational and service opportunities for Baylor students were enhanced, including the initiation of "Steppin' Out," which began in 1985 and quickly grew into one of the largest community service projects on an American college campus. Through this program, which still continues to this day, thousands of members of the Baylor family join hands to perform special tasks for those in need in the community.

Over his last four years as president, Reynolds continued along the path which he had set for guiding Baylor to new heights. With the support and generosity of special friends of the university, Reynolds worked with the Board of Regents to establish George W. Truett Theological Seminary with its first class of 51 men and women beginning classes the fall of 1994. In 2002, while Reynolds served as President Emeritus, Baylor officially dedicated the Baugh-Reynolds Campus of Truett Seminary, named after Reynolds and great friend of the university John Baugh. In collaboration with the faculty, Reynolds continued to create new curriculum opportunities, including several master's and doctoral programs. Under Reynolds, a total of 757 National Merit Scholars were enrolled and the university ranked in the top one percent of the nation's educational institutions in

the number of Scholars enrolling each year. One such scholar was named a Rhodes Scholar in 1989, the third in the history of the institution.

Reynolds retired from the Baylor presidency in 1995, and became Chancellor until 2000, when he became President Emeritus. He received the coveted Baylor Founders Medal in 2000, the Scottish Rite Stephen F. Austin Award in 2000, the prestigious Independent Colleges and Universities of Texas Founders Medal in 2001, and the Association of Fundraising Professionals Lifetime Achievement Award in 2002. In 2003 he was named the Texas Baptist Elder Statesman. Generous benefactors of the university, the Reynolds were inducted into the Baylor University Medallion Fellowship with the Pat Neff medallion in fall 2006.

Reynolds was chair of the Texas Commission on Judicial Efficiency from 1995-97 and was a member of the Texas Select Committee on Higher Education. In addition, he was a deacon and former deacon chairman of the First Baptist Church of Waco. He was a 33rd degree Mason, a member of numerous honor, professional and civic organizations, and was also a licensed psychologist.

Reynolds is survived by his wife, Joy, whom he married in 1950, and by three children: Kevin, Kent, and Rhonda; two daughters-in-law, Katy, and Cathy; a son-in-law, Greg Winslett; and seven grandchildren, Jonathan, Melinda, Sam, Nicole, Jake, Trey and Dylan. Together, the Reynolds' family holds a total of thirteen degrees from Baylor.

L.L.O.

ELSPETH DAVIES ROSTOW

1917-2007

When Elspeth Rostow came to The University of Texas in 1969, the only place she knew in Texas was the Johnson family ranch. In the 38 years since then, Rostow became one of the most respected figures on campus and throughout the state, known to all as a soft-spoken, formidable, and unfailingly kind woman. She died of a heart attack Dec. 9 at age 90.

Elspeth Davies was born in New York City, took degrees from Columbia and Harvard, and at age 20 embarked on a teaching career that would last more than 70 years, first at Barnard, then MIT, then Texas. In 1947 she married economist Walt Rostow, who would later serve as a special assistant to Presidents Kennedy and Johnson. At the time, Elspeth was working in Geneva as a correspondent for *The London Economist*. She earned a second master's degree in 1949 from Cambridge.

Elspeth and her husband spent eight years in Washington, from 1961-68. What brought the two of them to UT was the opening of the LBJ Presidential Library and Museum in 1969. The University offered both Rostows teaching positions.

From 1977-83 Elspeth served as dean of the LBJ School of Public

Affairs and helped lead the school toward the national prominence it now commands. Even as dean, Rostow continued to teach courses on the modern presidency and foreign policy. In 1991, she and her husband started the Austin Project to help fight crime, poverty, and drugs in Austin.

Elspeth was a longtime friend of the Texas Exes. She was a Life Member, and since 1982 served on the Texas Exes Scholarship Committee. Countless students may best remember the singularly penetrating, and frankly, terrifying questions she asked scholarship applicants. One student who had generously listed fluency in French among his academic qualifications found himself on the receiving end of one of Elspeth's legendary questions – put to him in flawless French. In 2005, Elspeth received the Distinguished Service Award, the Texas Exes' highest award for non-alumni.

Below, her good friend and colleague, Betty Sue Flowers, director of the LBJ Presidential Library and Museum, remembers the Elspeth Rostow we variously knew, feared and loved . . .

Arriving at the White House for a dinner, Elspeth noticed that another woman was wearing the same dress. She quickly removed a number of large flowers from a vase and concocted a flowery sash that distinguished her dress from that of the other guest. Characteristically, these actions were playful, resourceful—and kind. Elspeth seemed to observe everything, so that when she spoke, you had a sense that she could have said a great deal more, but was intentionally reserving further comment. What she did say was so elegantly phrased that many of us assumed she could produce her memoirs by simply dictating them in the complete sentences in which she always spoke. In the discussions following lectures, when Elspeth rose to speak, we strained to listen, not just because she had a soft voice, but because every word would be to the point. She would generally share a first-hand experience that illuminated the subject, and she would dispense with nonsense so clearly that the subject was simply finished—and sometimes so was the speaker. That was that. You could never predict what she would say. Consequently, in her presence, we were always a little more alert in thought and speech, as if she inspired the lighting of an extra candle in the brain. Around her, there was more life—and always more laughter.

She was a beautiful and inspiring woman, a writer of witty verse and a muse to others, including the great poet John Berryman. Her appearance, like her speech, was deliberate. The first time I met her, she knew I had recently returned from a seminar at the Aspen Institute. She asked me to lunch at the Faculty Club, and when I arrived, I noticed that she was wearing a gold aspen leaf . . . which began a conversation. The last time I saw her was 32 years later, at a dinner on December 7, two days before her death. As she walked into the room, holding out both hands in greeting, she called my attention to her pearl brooch, explaining that it was in commemoration of Pearl Harbor. Her tone held that wonderful irony that was so often the doorway to a story.

Now we'll be telling stories about her—but never so well as she, with that fastidious phrasing, that discerning wit, and that deceptively playful, edge-of-irony tone.

*I've often heard
That those who die
Decline to state
The reason why.
Which makes the ones
Who go on living
Incline to be
The least forgiving.*

*And so it seems
That to desist
From breathing will not
Make you missed,
For those who breathe
Know not the reason,
And those who die
Are out of season.*

Elspeth Rostow, 1939

For once, Elspeth had it wrong—some who die are never out of season, for when we remember them, our hearts are glad.

B.S.F.

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PAST PRESIDENTS

*Mirabeau Buonaparte Lamar	1837-59
*Ira Kendrick Stephens	1936
*Charles Shirley Potts	1937
*Edgar Odell Lovett	1938
*George Bannerman Dealey	1939
*George Waverley Briggs	1940
*William James	1941
*George Alfred Hill Jr.	1942
*Edward Henry Cary	1943
*Edward Randall	1944
*Umphey Lee	1944
*Eugene Perry Locke	1945
*Louis Herman Hubbard	1946
*Pat Ireland Nixon	1947
*Ima Hogg	1948
*Albert Perley Brogan	1949
*William Lockhart Clayton	1950
*A. Frank Smith	1951
*Ernest Lynn Kurth	1952
*Dudley Kezer Woodward Jr.	1953
*Burke Baker	1954
*Jesse Andrews	1955
*James Pinckney Hart	1956
*Robert Gerald Storey	1957
*Lewis Randolph Bryan Jr.	1958
*W. St. John Garwood	1959
*George Crews McGhee	1960
*Harry Hunt Ransom	1961
*Eugene Benjamin Germany	1962
*Rupert Norval Richardson	1963
*Mrs. George Alfred Hill Jr.	1964
*Edward Randall Jr.	1965
*McGruder Ellis Sadler	1966
*William Alexander Kirkland	1967
*Richard Tudor Fleming	1968

*Deceased

*Herbert Pickens Gambrell	1969
*Harris Leon Kempner	1970
*Carey Croneis	1971
*Willis McDonald Tate	1972
*Dillon Anderson	1973
*Logan Wilson	1974
*Edward Clark	1975
*Thomas Hart Law	1976
*Truman G. Blocker Jr.	1977
*Frank E. Vandiver	1978
*Price Daniel	1979
*Durwood Fleming	1980
Charles A. LeMaistre	1981
*Abner V. McCall	1982
*Leon Jaworski	1983
Wayne H. Holtzman	1983
Jenkins Garrett	1984
Joe R. Greenhill	1985
William Pettus Hobby	1986
*Elsbeth Rostow	1987
John Clifton Caldwell	1988
J. Chrys Dougherty	1989
*Frank McReynolds Wozencraft	1990
William C. Levin	1991
*William D. Seybold	1992
Robert Krueger	1993
Steven Weinberg	1994
*William H. Crook	1995
*Charles C. Sprague	1996
Jack S. Blanton Sr.	1997
William P. Wright Jr.	1998
Patricia Hayes	1999
A. Baker Duncan	2000
Ellen C. Temple	2001
George C. Wright	2002
J. Sam Moore Jr.	2003
Alfred F. Hurley.	2004
Harris L. Kempner	2005
S. Roger Horchow	2006
Isabel B. Wilson	2007

*Deceased

MEETINGS

of The Philosophical Society of Texas

- | | |
|--|---------------------------|
| 1837—Founded at Houston,
December 5 | 1968—San Antonio |
| 1840—Austin, January 29 | 1969—Salado |
| 1936—Chartered, January 18 | 1970—Salado |
| 1936—Reorganizational meet-
ing—Dallas, December 5 | 1971—Nacogdoches |
| 1937—Meeting and inaugural
banquet—Dallas, January 29 | 1972—Dallas |
| 1937—Liendo and Houston,
December 4 | 1973—Austin (Lakeway Inn) |
| 1938—Dallas | 1974—Austin |
| 1939—Dallas | 1975—Fort Worth |
| 1940—San Antonio | 1976—San Antonio |
| 1941—Austin | 1977—Galveston |
| 1942—Dallas | 1978—Houston |
| 1943—Dallas | 1979—Austin |
| 1944—Dallas | 1980—San Antonio |
| 1945—Dallas | 1981—Dallas |
| 1946—Dallas | 1982—Galveston |
| 1947—San Antonio | 1983—Fort Worth |
| 1948—Houston | 1984—Houston |
| 1949—Austin | 1985—College Station |
| 1950—Houston | 1986—Austin |
| 1951—Lufkin | 1987—Kerrville |
| 1952—College Station | 1988—Dallas |
| 1953—Dallas | 1989—San Antonio |
| 1954—Austin | 1990—Houston |
| 1955—Nacogdoches | 1991—Galveston |
| 1956—Austin | 1992—Dallas |
| 1957—Dallas | 1993—Laredo |
| 1958—Austin | 1994—Austin |
| 1959—San Antonio | 1995—Corpus Christi |
| 1960—Fort Clark | 1996—Dallas |
| 1961—Salado | 1997—Houston |
| 1962—Salado | 1998—Abilene |
| 1963—Nacogdoches | 1999—Austin |
| 1964—Austin | 2000—San Antonio |
| 1965—Salado | 2001—Austin |
| 1966—Salado | 2002—Fort Worth |
| 1967—Arlington | 2003—El Paso |
| | 2004—Denton |
| | 2005—Galveston |
| | 2006—Dallas |
| | 2007—Houston |

PREAMBLE

We the undersigned form ourselves into a society for the collection and diffusion of knowledge—subscribing fully to the opinion of Lord Chancellor Bacon, that “knowledge is power”; we need not here dilate on its importance. The field of our researches is as boundless in its extent and as various in its character as the subjects of knowledge are numberless and diversified. But our object more especially at the present time is to concentrate the efforts of the enlightened and patriotic citizens of Texas, of our distinguished military commanders and travelers,—of our scholars and men of science, of our learned members of the different professions, in the collection and diffusion of correct information regarding the moral and social condition of our country; its finances, statistics and political and military history; its climate, soil and productions; the animals which roam over our broad prairies or swim in our noble streams; the customs, language and history of the aboriginal tribes who hunt or plunder on our borders; the natural curiosities of the country; our mines of untold wealth, and the thousand other topics of interest which our new and rising republic unfolds to the philosopher, the scholar and the man of the world. Texas having fought the battles of liberty, and triumphantly achieved a separate political existence, now thrown upon her internal resources for the permanence of her institutions, moral and political, calls upon all persons to use all their efforts for the increase and diffusion of useful knowledge and sound information; to take measures that she be rightly appreciated abroad, and acquire promptly and fully sustain the high standing to which she is destined among the civilized nations of the world. She calls on her intelligent and patriotic citizens to furnish to the rising generation the means of instruction within our own borders, where our children—to whose charge after all the vestal flame of Texian liberty must be committed—may be indoctrinated in sound principles and imbibe with their education respect for their country’s laws, love of her soil and veneration for her institutions. We have endeavored to respond to this call by the formation of this society, with the hope that if not to us, to our sons and successors it may be given to make the star, the single star of the West, as resplendent for all the acts that adorn civilized life as it is now glorious in military renown. Texas has her captains, let her have her wise men.

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(NAME OF SPOUSE APPEARS IN PARENTHESES)

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- BUSH, LAURA WELCH (GEORGE), first lady of the United States of America, founder of the Texas Book Festival, *Washington, D.C.*
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CORNYN, JOHN, U.S. Senator, Deputy Whip in Senate, *Washington, D.C.*

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CRAVEN, JUDITH LYNN BERWICK (MORITZ), past president, United Way of the Texas Gulf Coast; regent, The University of Texas System, *Houston*

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- CULLUM, LEE, journalist contributing columns to *Dallas Morning News* and commentaries to National Public Radio's *All Things Considered* and to *News Hour with Jim Lehrer*; author of *Genius Came Early: Creativity in the Twentieth Century*, *Dallas*
- CUNNINGHAM, WILLIAM H. (ISABELLA), former president, The University of Texas at Austin; former chancellor, The University of Texas System, *Austin*
- CURTIS, GREGORY (TRACY), editor, *Texas Monthly*, 1981-2000; author, *Austin*
- DAILEY, MACEO (SONDRA), director of African American Studies and assistant professor of history at The University of Texas at El Paso; board chair of Humanities Texas, *El Paso*
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- DE WETTER, MARGARET BELDING, artist and poet, *El Paso*
- DEAN, DAVID A. (JEAN), lawyer; former secretary of state, Texas, *Dallas*
- DEBAKEY, MICHAEL E., cardiovascular surgeon; chancellor emeritus, Baylor College of Medicine, *Houston*
- DECHERD, ROBERT W. (MAUREEN), chairman, president, and chief executive officer, A. H. Belo Corporation, *Dallas*
- DE LA TEJA, JESÚS F. (MAGDALENA), appointed first Texas Historian 2007 by the Governor; Department of History Chair, Texas State University; President Board of Directors, Texas State Historical Association, *San Marcos*
- DELCO, WILHELMINA (EXALTON), former member, Texas House of Representatives; civic leader; adjunct professor, Community College Leadership Program, The University of Texas at Austin; and chair, Board of Trustees, Huston-Tillotson College, *Austin*
- DENIUS, FRANKLIN W. (CHARMAINE), lawyer; former president, the

- University of Texas Ex-Students' Association; member, Constitutional Revision Committee; Distinguished Alumnus, The University of Texas at Austin; decorated veteran of World War II, *Austin*
- DENTON, P. LYNN (MARK), founding director of the Bob Bullock Texas State History Museum; past-president, Texas Association of Museums, *Dripping Springs*
- DEWHURST, DAVID, lieutenant governor of Texas, veteran, businessman, rancher, *Austin*
- DICK, JAMES, founder-director, International Festival-Institute at Round Top; concert pianist and teacher, *Round Top*
- DJEREJIAN, EDWARD P. (FRANCOISE HAELTERS), Founding and present Director of the James Al Baker III Institute for Public Policy at Rice University, former U.S. Ambassador to Israel and former U.S. Ambassador to the Syrian Arab Republic, *Houston*
- DOBIE, DUDLEY R., JR. (SAZA), successor trustee, Clayton Foundation of Research; shareholder, Brorby & Crozier, P. C., *Austin*
- DOUGHERTY, J. CHRYS, III, retired attorney; former Honorary French Consul in Austin; former president, State Bar of Texas; former trustee, St. Stephen's Episcopal School, Austin; former trustee, The University of Texas Law School Foundation; trustee, Texas Supreme Court Historical Society, The Austin Project; Administrative vice-chair, Texas Appleseed, *Austin*
- DOUGHERTY, J. CHRYS, IV (MARY ANN), director of research, Just for the Kids, *Austin*
- DUGGER, RONNIE E. (PATRICIA BLAKE), reporter, writer, social structure activist, *Austin and Cambridge, MA*
- DUNCAN, A. BAKER (SALLY), chairman, Duncan-Smith Investments Inc., *San Antonio*
- DUNCAN, CHARLES WILLIAM, JR. (ANNE), chairman, Duncan Interests; former secretary, U.S. Energy Department; deputy secretary, U.S. Defense Department; president, The Coca-Cola Company; chairman, Rotan Mosle Financial Corporation, *Houston*
- DUNCAN, JOHN HOUSE (BRENDA), businessman; chairman, board of trustees, Southwestern University, *Houston*
- EARVIN, LARRY L., president, Huston-Tillotson College; former dean, School of Arts and Sciences, Clark Atlanta University, *Austin*
- EMANUEL, VICTOR LLOYD, naturalist and founder of Victor Emanuel Nature Tours, *Austin*
- FARABEE, KENNETH RAY (MARY MARGARET), former vice-chancellor and general counsel, The University of Texas System; former member, Texas Senate, *Austin*

- FAULKNER, LARRY R. (MARY ANN), president, The University of Texas at Austin, *Austin*
- FEHRENBACH, T. R. (LILLIAN), author; historian; former chairman, commissioner emeritus, Texas Historical Commission; former chairman, Texas Antiquities Committee; fellow, Texas State Historical Association, *San Antonio*
- FEIGIN, RALPH D. (JUDITH), president and chief executive officer of Baylor College of Medicine, *Waco*
- FISHER, RICHARD (NANCY), ambassador and deputy U.S. trade representative; vice-chair, Overseas Private Investment Corp. (OPIC), former managing partner, Fisher Capital Management; former executive assistant to U.S. secretary of the treasury; adjunct professor, Lyndon Baines Johnson School of Public Affairs, The University of Texas at Austin; democratic nominee for U.S. Senate, 1994; founder, Dallas Committee on Foreign Relations, *Dallas*
- FLATO, EDWARD C. (KATY), architect, Lake/Flato, *San Antonio*
- FLAWN, PETER T. (PRISCILLA), president emeritus, The University of Texas at Austin, *Austin*
- FLEMING, CHERYL (JON), dean, Margaret Petree School of Performing Arts in Oklahoma City; served as advisor-consultant of the Metropolitan Opera; award-winning poet, *North Zulch*
- FLEMING, JON HUGH (CHERYL), President, Texas Wesleyan University 1978-84; Member, Governor's Select Committee on Public Education 1983-84; Member, Executive Committee, Governor's Criminal Justice Task Force 1985-87; Chairman and Chairman Emeritus, Texas Education Reform Foundation; rancher, lover of nature and the arts and . . . grateful participant in the life of the state and nation, *North Zulch*
- FLORES, DIONICIO, regent, Texas State University; executive vice-president and editor, *El Paso Times*, *El Paso*
- FLOWERS, BETTY SUE, director, Lyndon Baines Johnson Presidential Library, *Austin*
- FRANCIS, JAMES B. JR., president, Francis Enterprises, Inc.; board of directors, Silverleaf Resorts, Inc.; trustee, Southwest Research Institute, *Dallas*
- FRANCIS, L. FREDERICK "RICK" (GINGER), vice chairman, director, Bank of the West; board of directors, Western Refining Inc; Board of Regents Chairman, Texas Tech University System; board of managers, El Paso Workforce Collaborative, *El Paso*
- FRAZIER, DONALD (SUSAN), professor of history, McMurry University; fellow and executive director, Grady McWhiney Research Foundation, *Abilene*

FROST, PAT (KELLEY), president, Frost National Bank; serves on over ten non-profit boards in San Antonio, *San Antonio*

FROST, TOM C. (PATRICIA), senior chairman of the board, Frost National Bank, *San Antonio*

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GILLETTE, MICHAEL L. (LEANN), director, Humanities Texas; retired, National Archives, *Austin*

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- GOLDSTEIN, JOSEPH L., professor of medicine and molecular genetics, The University of Texas Southwest Medical Center; Nobel laureate in medicine or physiology, *Dallas*
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- GRANOF, MICHAEL H. (DENA HIRSCH), member, U.S. Comptroller General's Advisory Committee Council on Government Auditing Standards and Educational Advisory Committee; member, University of Texas System Advisory Council; professor of accounting, University of Texas at Austin, *Austin*
- GRANT, JOSEPH M., chairman and chief executive officer, Texas Capital Bancshares, Inc., *Dallas*
- GREENHILL, JOE R. (MARTHA), lawyer; former chief justice, Supreme Court of Texas, *Austin*
- GRUBEN, WILLIAM C. (MARILU), vice president, senior economist, Federal Reserve Bank of Dallas; director, Bank's Center for Latin American Economics; adjunct professor, Department of Economics, Southern Methodist University, & Department of International Studies, University of Texas at Dallas, *Dallas*
- GUEST, WILLIAM F. (AMY), attorney; former chairman, American Capitol Insurance Company, *Houston*
- GULLETT, JOHN, physician, *Abilene*
- GUNTER, PETE A.Y. (ELIZABETH), Regents Professor of Philosophy, University of North Texas; member, Texas Institute of Letters; board of directors, *Southwest Philosophy Review*; president, Association for Process Philosophy of Education; lifetime board member and past president, Big Thicket Association, *Denton*
- GUTHRIE, JUDITH K., United States Magistrate Judge, U.S. District Court, Eastern District of Texas, *Tyler*
- HAMILTON, ANN THOMAS, grant officer, Houston Endowment, Inc.; director Jacob and Terese Hershey Foundation, *Houston*
- HAMM, GEORGE FRANCIS (JANE), president, The University of Texas at Tyler, *Tyler*
- HARDESTY, ROBERT L. (MARY), former president, Southwest Texas State University; former assistant to the president of the United States; former chairman, board of governors, United States Postal Service; former vice-chancellor, The University of Texas System, *Austin*
- HARRIGAN, STEPHEN MICHAEL (SUE ELLEN), author; contributing editor, *Texas Monthly*, *Austin*
- HARTE, CHRISTOPHER M. (KATHERINE STODDARD POPE), investments, *Portland, ME*

- HARTE, EDWARD HOLMEAD, former publisher, *Corpus Christi Caller-Times, Corpus Christi*
- HAY, JESS (BETTY JO), chairman, HCB Enterprises, Inc.; chairman, Texas Foundation for Higher Education; former member, board of regents, The University of Texas System, *Dallas*
- HAYES, PATRICIA A., executive vice-president and chief operating officer, Seton Healthcare Network, *Austin*
- HECHT, NATHAN LINCOLN, justice, Supreme Court of Texas, *Austin*
- HERSHEY, TERESE TARLTON "TERRY," civic leader; Houston Parks Board; National Association of Flood Plain Managers Foundation; National Recreation and Park Association; Texas Women's Hall of Fame; former board member, National Audubon Society; Trust for Public Lands, Texas Parks and Wildlife Commission; Lady Bird Johnson Wildflower Center; Frances K. Hutchison Medal for distinguished service to conservation, Garden Club of America, *Houston*
- HEYER, GEORGE STUART, JR., emeritus professor of the history of doctrine, Austin Presbyterian Theological Seminary, *Austin*
- HIGGINBOTHAM, PATRICK E. (ELIZABETH), judge, U.S. Court of Appeals, Fifth Circuit, *Dallas*
- HILGERS, WILLIAM B., attorney; former chairman, Supreme Court of Texas Grievance Oversight Committee, *Del Valle*
- HILL, LYDA, president, Hill Development Company and Seven Falls Company, *Dallas*
- HINES, GERALD DOUGLAS (BARBARA), chairman, Hines Interests, *Houston*
- HIXON, SARITA A. (ROBERT), commissioner Texas Historical Commission 2005, past chair of San Jacinto Museum of History; Elected Kenedy County Commissioner, Precinct 3 2008. *Houston*
- HO, JAMES C. (ALLYSON), attorney, Gibson, Dunn, & Crutcher, LLP; law clerk, U.S. Supreme Court Justice Clarence Thomas, *Dallas*
- HOBBY, DIANA (WILLIAM), *Houston*
- HOBBY, WILLIAM PETTUS (DIANA), lieutenant governor of Texas, 1973-1991; Radoslav A. Tsanoff Professor, Rice University 1989-present;; Sid Richardson Professor, Lyndon Baines Johnson School of Public Affairs, The University of Texas at Austin, 1991-1997; chancellor, University of Houston System, *Houston*
- HOFFMAN, PHILIP GUTHRIE (MARY), president emeritus, University of Houston; former president, Texas Medical Center, Inc., *Houston*
- HOLLAMAN, ELIZABETH E., former head, Trinity Episcopal School, educational consultant; president, Cavalry Consulting, *Galveston*

- HOLTZMAN, WAYNE H. (JOAN), professor of psychology and education emeritus; special counsel, Hogg Foundation for Mental Health, The University of Texas at Austin, *Austin*
- HOOK, HAROLD SWANSON (JOANNE), retired chairman and chief executive, American General Corporation; trustee, Baylor College of Medicine; former national president of the Boy Scouts of America; Texas Business Hall of Fame, *Houston*
- HORCHOW, S. ROGER (CAROLYN), founder and former CEO of the Horchow Collection, author, theatrical producer, *Dallas*
- HOWE, JOHN P., III, physician; president and CEO, Project Hope, *Washington, D.C.*
- HUDSON, EDWARD R. JR. (ANN FRASHER), independent oil producer; board member, Kimbell Art Foundation, Burnett Foundation, Modern Art Museum of Fort Worth, Aspen Art Museum, and Aspen Center for Physics, Friends of Art and Preservation in Embassies, *Fort Worth*
- HUEY, MARY EVELYN (GRIFFIN), president emerita, Texas Woman's University, *Denton*
- HUFFINES, JAMES R. (PATTY), former chairman of the Board of Regents of the University of Texas System and current vice chairman of the Board of Regents; Chairman, Central & South Texas for Plains Capital Bank, *Austin*
- HUGHES, VESTER T., JR.; lawyer; founding partner, Hughes & Luce, *Dallas*
- HUNT, WOODY L. (GAYLE), chairman and CEO, Hunt Building Corporation; member, The University of Texas System Board of Regents; member of numerous local and state business and charitable boards, *El Paso*
- HURLEY, ALFRED FRANCIS (JOANNA), chancellor, University of North Texas System, *Denton*
- HUTCHISON, KAY BAILEY (RAY), U.S. senator; former state treasurer, Texas, *Dallas and Washington, D.C.*
- INMAN, BOBBY R. (NANCY), admiral, U.S. Navy (retired); investor, *Austin*
- JACK, JANIS GRAHAM (WILLIAM DAVID), U.S. district judge, *Corpus Christi*
- JACKSON, LEE, chancellor, University of North Texas System; former member, Texas House of Representatives; four-time Dallas County Judge, *Denton*
- JACOBS, GARY, chairman, president, and CEO, Laredo National Bancshares Inc., *Laredo*
- JAMAIL, JOSEPH D., JR. (LEE), attorney; philanthropist, *Houston*

JAMES, THOMAS N. (GLEAVES), cardiologist; Professor of Medicine, Professor of Pathology, Inaugural Holder of the Thomas N. and Gleaves T. James Distinguished Chair in Cardiological Sciences, former president, The University of Texas Medical Branch at Galveston, *Galveston*

JOHNSON, CLAY III, Deputy Director, Management, Office of Management and Budget, *Washington D.C.*

JOHNSON, LUCI BAINES (IAN TURPIN), chair of the LBJ Holding Company, *Austin*

JORDAN, BRYCE (BARBARA), former president, Pennsylvania State University, *Austin*

JUSTICE, WILLIAM WAYNE (SUE), senior judge, U.S. District Court, Eastern District of Texas, sitting by designation in the Western District of Texas, *Austin*

**KAIN, COLLEEN T., retired executive assistant, The University of Texas at Austin, *Austin*

KECK, RAY M. (PATRICIA), president, Texas A&M International University, former provost & vice-president for Academic Affairs, *Laredo*

KELLY, DEE J. (JANICE), attorney, *Fort Worth*

KELSEY, MAVIS PARROTT SR., retired physician; founder and former chief, Kelsey-Seybold Clinic, *Houston*

KELTON, ELMER (ANNA), fiction writer, livestock journalist, *San Angelo*

KEMPNER, HARRIS L., JR. (HETTA), trustee, H. Kempner; president, Kempner Capital Management, Inc., *Galveston*

KEMPNER, RUTH L., *Galveston*

KESSLER, JAMES LEE (SHELLEY), Rabbi, Temple B'nai Israel; founder and first president, Texas Jewish Historical Society, *Galveston*

KING, CAROLYN DINEEN (THOMAS M. REAVLEY), chief judge, U.S. Court of Appeals for the Fifth Circuit, *Houston*

KING, ROBERT D., professor, Linguistics, founding dean, College of Liberal Arts, The University of Texas at Austin, *Austin*

KLEBERG, SALLY SEARCY, financial educator; family office manager, *New York and San Antonio*

KLEIN, MELVYN N. (ANNETTE), managing partner of GKH Partners, L.P., attorney; adjunct professor, Texas A&M University-Corpus Christi, *Corpus Christi*

KRIER, CYNDI TAYLOR (JOSEPH), former member, Texas Senate; vice-president of Texas government relations, USAA; partner, Vallejo Ranch, *San Antonio*

- KRUEGER, ROBERT "BOB" CHARLES (KATHLEEN), U.S. Ambassador to Botswana; former U.S. senator, congressman, ambassador to Burundi, ambassador-at-large to Mexico; former Texas Railroad commissioner; former vice-provost and dean of Arts and Sciences, Duke University; president, Krueger Associates, *New Braunfels*
- LABOON, ROBERT BRUCE (RAMONA), partner, Locke Liddell & Sapp, *Houston*
- LANE, NEAL (JONI), senior fellow, James A. Baker III Institute for Public Policy, Department of Physics and Astronomy, Rice University; director, White House Office of Science and Technology Policy, *Houston*
- LARIVIERE, RICHARD W. (JANIS), dean, College of Liberal Arts, The University of Texas at Austin, *Austin*
- LASATER, GARLAND M., JR. (MOLLIE), board member, Community Foundation of North Texas, McDonald Observatory of The University of Texas, Aspen Center for Physics, Museum of Science and History, *Fort Worth*
- LEBERMANN, LOWELL H., JR., president, Centex Beverage, Inc., *Austin*
- LEE, ELIZABETH MAXWELL (WILLIAM), executive director, Foundation for the Education of Young Women; founder, Irma Rangel Leadership School for Young Women, *Dallas*
- LEEBRON, DAVID W. (Y. PING SUN), president, Rice University, former dean Columbia University School of Law, *Houston*
- LEMAISTRE, CHARLES A. (JOYCE), president emeritus, the University of Texas System Cancer Center M. D. Anderson Hospital and Tumor Institute, *San Antonio*
- LEVIN, WILLIAM C., physician; former president and Ashbel Smith Professor, the University of Texas Medical Branch at Galveston, *Galveston*
- LINDSEY, JOHN H. (SARA), businessman; art collector; civic leader; former member, board of directors, Museum of Fine Arts; director, Alley Theatre; member, board of regents, Texas A&M University System; former member of the board of the United States Military Academy at West Point, *Houston*
- LIVINGSTON, WILLIAM S. (LANA), senior vice president, The University of Texas at Austin, *Austin*
- LOCHRIDGE, LLOYD (FRANCES), lawyer; former president, State Bar of Texas; former member, board of governors, American Bar Association, *Austin*
- LOCKE, JOHN PATRICK (RAMONA), president, Locke Holdings, Inc., *Dallas*

- LORD, GROGAN (BETTY), senior chairman, First Texas Bancorp; member, Texas Securities Board; trustee, Southwestern University, *Georgetown*
- LOW, GILBERT, lawyer, *Beaumont*
- LOWE, RICHARD (KATHY), Regents Professor, University of North Texas; author and recipient of Jefferson Davis Award of the Museum of the Confederacy for *Walker's Texas Division, CSA: Greyhounds of the Trans-Mississippi*, author of several books, *Denton*
- LOWMAN, ALBERT T. (DARLYNE), past president, Texas Folklore Society, Book Club of Texas, Texas State Historical Association; managing partner, Lowman Ranch, Ltd., *San Marcos*
- MACKINTOSH, PRUDENCE M. (JOHN), author; member, Texas Institute of Letters, *Dallas*
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- MADDEN, WALES H., JR. (ABBIE), attorney; former member, board of regents, The University of Texas System, *Amarillo*
- MARGO, ADAIR WAKEFIELD (DONALD R. "DEE"), owner, Adair Margo Gallery; member, Texas Higher Education Coordinating Board; State Advisory Council, Texas Book Festival; chairman, President's Council on the Arts and Humanities, *El Paso*
- MARK, HANS (MARION), professor of aerospace engineering, The University of Texas at Austin, *Austin*
- MARSH, GWENDOLYN "WENDY" O. (STANLEY), civic volunteer active in arts and education, *Amarillo*
- MARTIN, JAMES C., interim director, Texas State Historical Association; former executive director, San Jacinto Museum of History Association, *Austin*
- MARTIN, ROBERT S. (BARBARA), director, Institute for Museum and Library Sciences; former director, Texas State Library, *Corinth and Washington, D.C.*
- MARTINEZ, PHILIP, El Paso district judge; former director El Paso Legal Assistance Society, El Paso Holocaust Museum, El Paso Cancer Treatment Center, and Hispanic Leadership Institute, *El Paso*
- MARTINEZ, VIDAL G. (DEBORAH), partner, Franklin, Cardwell, & Jones; Chairman, Texas Public Education Reform Foundation, *Houston*
- MARZIO, PETER CORT, director, the Museum of Fine Arts, Houston, *Houston*
- MATTHEWS, JUDY JONES, president, Dodge Jones Foundation, *Abilene*

- MATTHEWS, KATHLEEN SHIVE, dean, Wiess School of Natural Sciences, Rice University; elected to American Association for the Advancement of Science, *Houston*
- MCCOMBS, B. J. "RED" (CHARLINE), owner, Minnesota Vikings, *San Antonio*
- MCCORQUODALE, ROBIN HUNT; novelist, *Houston*
- MCCOWN, F. SCOTT (MAURA POWERS), executive director, Center for Public Policy Priorities, retired judge, 345th District Court, Travis County, Texas, named by *Texas Monthly* as one of "The 25 Most Powerful People in Texas Politics," *Austin*
- MCDERMOTT, MARGARET (EUGENE), The University of Texas at Austin Distinguished Alumna; patron of the arts, education, and medicine in various community involvements; member, International Council of Museum of Modern Art in New York and the Dallas Shakespeare Club; honorary alumnus of the Massachusetts Institute of Technology, *Dallas*
- MCFADDEN, JOSEPH M., president emeritus, professor of history, University of St. Thomas, *Houston*
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- MCKNIGHT, JOSEPH WEBB (MIMI), professor, Southern Methodist School of Law; legal historian; law reformer, *Dallas*
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- MCNEILL, LARRY, board member, Texas State Historical Association; board member, Texas Supreme Court Historical Society; president, managing shareholder, Clark, Thomas & Winters, P.C., *Austin*
- MCREYNOLDS, JIM (JUDY), member, Texas House of Representatives; former faculty member, Stephen F. Austin State University; owner, Chaparral Energy, Inc., *Lufkin*
- MERSKY, ROY M. (ROSEMARY), professor of law, director, University of Texas Law Library; professor, University of Texas School of Information; board of trustees, Texas Supreme Court Historical Society, *Austin*
- MIDDLETON, HARRY J. (MIRIAM), director emeritus, Lyndon B. Johnson Presidential Library and Museum; executive director, Lyndon B. Johnson Foundation, *Austin*
- MILLER, CHARLES (BETH), chairman, Meridian National, Inc., *Houston*
- MONDAY, JANE CLEMENTS (CHARLES), former regent, Texas State University System; public commissioner, Southern Association of College and Schools; author, *Huntsville*

- MOORE, J. SAM, JR. (GRETA), retired lawyer; former chairman, Texas Committee for the Humanities; former member, Texas Law Review Association, *El Paso*
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- POWELL, BOONE (DIANNE), chairman, Ford, Powell, & Carson, Architects; College of Fellows, American Institute of Architects; former president, Texas Society of Architects; peer professional, U.S. General Services Administration, *San Antonio*
- POWERS, WILLIAM C., President, The University of Texas at Austin, Hines H. Baker and Thelma Kelly Baker Chair, University Distinguished Teaching Professor, *Austin*
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- PRESSLER, H. PAUL, III (NANCY), justice (retired), Court of Appeals of Texas, Fourteenth Supreme Judicial District, *Houston*
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- RANDALL, EDWARD, III (ELLEN), private investor; board of directors, EOG Resources Inc., Kinder Morgan, Inc., and EcPutlook.com, Inc., *Houston*

RANDALL, RISHER (FAIRFAX), former senior vice president and director, American General Investment Corporation; manager, family trusts, investments, and real estate, *Houston*

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ROACH, JOYCE G., Spur Award winner, Western Writers of America; recipient, Carr P. Collins prize for non-fiction, Texas Institute of Letters, *Keller*

ROBINSON, MARY LOU, U.S. district judge; former state appellate and trial judge, *Amarillo*

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 BENJAMIN FLOYD PITTINGER
 KENNETH S. PITZER
 GEORGE FRED POOL (1984)
 CHARLES SHIRLEY POTTS (1963)
 HERMAN PAUL PRESSLER JR. (1996)
 CHARLES NELSON PROTHRO (2000)
 HARRY MAYO PROVENCE (1996)
 MAURICE EUGENE PURNELL
 CHARLES PURYEAR (1940)
 CLINTON SIMON QUIN (1956)
 COOPER KIRBY RAGAN
 HOMER PRICE RAINEY (1985)
 CHARLES WILLIAM RAMSDELL
 (1942)
 EDWARD RANDALL (1944)
 EDWARD RANDALL JR. (1970)
 KATHARINE RISHER RANDALL
 (1991)
 LAURA BALLINGER RANDALL
 (1955)
 JO STEWART RANDEL (2002)
 HARRY HUNTT RANSOM (1976)
 EMIL C. RASSMAN
 FANNIE ELIZABETH RATCHFORD
 SAM RAYBURN (1961)
 JOHN SAYRES REDDITT (1972)
 HERBERT H. REYNOLDS (2007)
 LAWRENCE JOSEPH RHEA (1946)
 WILLIAM ALEXANDER RHEA (1941)
 JAMES OTTO RICHARDSON
 RUPERT NORVAL RICHARDSON
 (1987)
 JAMES FRED RIPPY

- A.W. "DUB" RITER (2003)
 SUMMERFIELD G. ROBERTS (1969)
 FRENCH MARTEL ROBERTSON
 (1976)
 CURTICE ROSSER
 JOHN ELIJAH ROSSER (1960)
 ELSPETH DAVIS ROSTOW (2007)
 JOSEPH ROWE
 JAMES EARL RUDDER (1969)
 THOMAS J. RUSK
 MCGRUDER ELLIS SADLER (1966)
 JEFFERSON DAVIS SANDEFER (1940)
 MARLIN ELIJAH SANDLIN
 HYMAN JUDAH SCHACHTEL (1991)
 EDWARD MUEGGE "BUCK"
 SCHIWETZ (1985)
 VICTOR HUMBERT
 SCHOFFELMAYER (1966)
 ARTHUR CARROLL SCOTT (1940)
 ELMER SCOTT (1954)
 JOHN THADDEUS SCOTT (1955)
 WOODROW BRADLEY SEALS (1991)
 TOM SEALY (1992)
 GEORGE DUBOSE SEARS (1974)
 WILLIAM G. SEARS (1997)
 ELIAS HOWARD SELLARDS (1960)
 WILLIAM DEMPSEY SEYBOLD (2004)
 DUDLEY CRAWFORD SHARP
 ESTELLE BOUGHTON SHARP (1965)
 JAMES LEFTWICH SHEPHERD JR.
 (1964)
 MORRIS SHEPPARD (1941)
 JOHN BEN SHEPPERD (1989)
 STUART SHERAR (1969)
 PRESTON SHIRLEY (1991)
 ALLAN SHIVERS (1985)
 RALPH HENDERSON SHUFFLER
 (1975)
 RALPH HENDERSON SHUFFLER II
 (2002)
 D.J. SIBLEY (2005)
 JOHN DAVID SIMPSON JR.
 ALBERT OLIN SINGLETON (1947)
 JOSEPH ROYALL SMILEY (1991)
 A. FRANK SMITH JR. (1993)
 A. FRANK SMITH SR. (1962)
 ASHBEL SMITH
 FRANK CHESLEY SMITH SR. (1970)
 HARLAN J. SMITH (1991)
 HENRY SMITH
 HENRY NASH SMITH
 THOMAS VERNON SMITH (1964)
 HARRIET WINGFIELD SMITHER
 (1955)
 ROBERT S. SPARKMAN (1997)
 RALPH SPENCE (1994)
 JOHN WILLIAM SPIES
 TOM DOUGLAS SPIES (1960)
 CHARLES C. SPRAGUE (2005)
 STEPHEN H. SPURR (1990)
 ROBERT WELDON STAYTON (1963)
 ZOLLIE C. STEAKLEY (1991)
 RALPH WRIGHT STEEN (1980)
 IRA KENDRICK STEPHENS (1956)
 MARSHALL T. STEVES (2001)
 ROBERT GERALD STOREY (1981)
 GEORGE WILFORD STUMBERG
 HATTON WILLIAM SUMNERS (1962)
 JEROME SUPPLE (2004)
 ROBERT LEE SUTHERLAND (1976)
 HENRY GARDINER SYMONDS (1971)
 MARGARET CLOVER SYMONDS
 (2001)
 WILLIS M. TATE (1989)
 JAMES U. TEAGUE (1996)
 ROBERT EWING THOMASON (1974)
 J. CLEO THOMPSON (1974)
 BASCOM N. TIMMONS (1987)
 LON TINKLE (1980)
 CHARLES RUDOLPH TIPS (1976)
 MARGARET LYNN BATTS TOBIN
 (1994)
 VIRGIL W. TOPAZIO (1999)
 JOHN G. TOWER (1991)
 HENRY TRANTHAM (1961)
 FRANK EDWARD TRITICO SR. (1993)
 ROBERT S. TROTTI (2005)
 GEORGE WASHINGTON TRUETT
 (1944)
 RADOSLAV ANDREA TSANOFF
 (1976)
 EDWARD BLOUNT TUCKER (1972)
 WILLIAM BUCKHOUT TUTTLE
 (1954)
 FRANK E. VANDIVER (2005)
 THOMAS WAYLAND VAUGHAN
 (1952)
 ROBERT ERNEST VINSON (1945)
 LESLIE WAGGENER (1951)
 AGESILAUS WILSON WALKER JR.
 (1988)
 EVERETT DONALD WALKER (1991)
 RUEL C. WALKER
 THOMAS OTTO WALTON
 FRANK H. WARDLAW (1989)
 ALONZO WASSON (1952)
 WILLIAM WARD WATKIN (1952)
 ROYALL RICHARD WATKINS (1954)
 WALTER PRESCOTT WEBB (1963)
 HARRY BOYER WEISER (1950)
 PETER BOYD WELLS JR. (1991)
 ELIZABETH HOWARD WEST (1948)
 CLARENCE RAY WHARTON (1941)
 JOHN A. WHARTON
 WILLIAM H. WHARTON
 WILLIAM MORTON WHEELER
 (1937)
 GAIL WHITCOMB (1994)

- JAMES LEE WHITCOMB
FRED N. WHITE (2006)
WILLIAM RICHARDSON WHITE
(1977)
C.G. WHITTEN (2001)
WILLIAM MARVIN WHYBURN
(1972)
HARRY CAROTHERS WIESS (1948)
DOSSIE MARION WIGGINS (1978)
PLATT K. WIGGINS
DAN C. WILLIAMS (2001)
JACK KENNY WILLIAMS (1982)
ROGER JOHN WILLIAMS (1987)
LOGAN WILSON (1992)
JAMES BUCHANAN WINN JR. (1980)
STUART WOLF (2005)
JAMES RALPH WOOD (1973)
DUDLEY KEZER WOODWARD JR.
(1967)
WILLIS RAYMOND WOOLRICH
(1977)
- BENJAMIN HARRISON WOOTEN
(1971)
SAM PAUL WORDEN (1988)
GUS SESSIONS WORTHAM (1976)
LYNDALL FINLEY WORTHAM
FRANK MCREYNOLDS
WOZENCRAFT (1993)
FRANK WILSON WOZENCRAFT
(1967)
WILLIAM EMBRY WRATHER (1963)
ANDREW JACKSON WRAY (1981)
CHARLES ALLEN WRIGHT (2000)
RALPH WEBSTER YARBOROUGH
RAMSEY YELVINGTON (1972)
HUGH HAMPTON YOUNG (1945)
SAMUEL DOAK YOUNG
STARK YOUNG
HENRY B. ZACHRY (1984)
PAULINE BUTTE ZACHRY (1998)