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"OIL AT THE BREAK POINT"

PREPARED TESTIMONY:

Dr. Daniel Yergin

Chairman

Cambridge Energy Research Associates

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Daniel Yergin, Chairman, Cambridge Energy Research Associates

Chairman Schumer, Vice Chair Maloney, Ranking Members, and, distinguished Members of the Joint Economic Committee:

It is an honor to appear before the Joint Economic Committee. I would like to express my appreciation to the Committee for the opportunity to appear this morning. In calling this hearing, the Committee is expressing its great concern about the impact of energy prices on the American public and the economy, and demonstrating the seriousness with which the Committee is seeking to understand and frame the issues. The Committee is wise to undertake and encourage this searching examination while policies are being considered and before they are framed. I am grateful for the chance to contribute to this consideration.

This morning I wish to focus on four specific aspects of the issue:

The "Oil Shock" and its causes, including the "traditional fundamentals" (supply and demand, geopolitics) and the "new fundamentals" (rapidly-rising costs for developing new oil and gas fields, and the increasing impact of financial markets).

The "Break-Point" world in which we are now living—and the forces set in motion by high prices, security, and reinforced by climate change.

The considerable opportunity for energy efficiency, which can make a very big impact in the near- and medium-term.

Observations on policy, including:

- the need to get beyond "either/or" energy debate and instead take a more ecumenical approach that recognizes the critical requirements of supplying energy to our $14 trillion economy;
- the importance of encouraging investment, which has to be increased in order to play "catch-up" with a growing world economy;
- the effectiveness and speed of markets in responding to shocks; and

- the way in which expectations going out 3 to 5 years are feeding into today's prices and how changes in supply and demand can influence those expectations.

I. Today's Oil Shock

That we are in an oil shock is clear, whether at the gasoline pump and the toll on consumers, in the obvious and painful impact on beleaguered industries like autos and airlines, in the effect on food prices, and in the financial difficulties that other industries are experiencing. This oil shock coincides with the credit crisis, adding to the pressures. The specter of stagflation—poor economic growth combined with inflation—supposedly banished since the 1970s, is before us again. Jean-Claude Trichet, the president of the European Central Bank, starkly outlined the risks when he recently noted the current "similarities" to the first and second oil shocks of the 1970s:

> One of the major similarities of course is that we must avoid unanchoring inflation expectations, avoid putting economies in general in a situation where they are weakening their own growth potential, where they are observing slower growth and mass unemployment…You can date from the first oil shock the start of much lower growth…[1]

Four years ago oil was around $40 a barrel. Today, it is over $135 a barrel, and there are alarming predictions of $200 and $250 a barrel—and even higher. What happened? What is happening?

In such circumstances as these, there is a tendency to seek a single explanation. History, however, demonstrates that changes of this scale and significance result not from a single cause, but rather from a confluence of factors. And that is the case with the epochal change in energy through which we are now living. When you consider the pressures in the markets, the impact on consumers and the economy, and the shifts at hand, we really are at a break point in terms of world oil.

We can divide the sources of the current high prices between the "traditional fundamentals" and what we might call the "new fundamentals".

The Traditional Fundamentals

The starting point is supply and demand. Specifically, in terms of demand, we are talking about the success of the global economy—five percent growth per year over the past five years—the best global economic performance in a generation. This has lifted hundreds and hundreds of millions of people out of

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[1] Jean-Claude Trichet, press conference, June 5, 2008, http://www.ecb.int/press/pressconf/2008/html/is080605.en.html

poverty. Countries—most notably China and India—that for decades lived in self-imposed economic isolation are now integrated with the world economy. Growing incomes and rising standards of living translate into rising demand for oil and energy and other commodities. We can see the difference. In the five years between 1998 and 2002, world oil demand grew at an average annual rate of 1.1 percent—for a total absolute growth of 4.2 million barrels per day. In the five years between 2003 and 2007, world oil demand grew at 2.1 percent—for a total absolute growth of 8.2 million barrels per day.

Supply has had trouble keeping up. As a result the balance between supply and demand has tightened. One major reason for the slow supply response is limitations around the world on access to areas for development. A second is uncertainty about investment, fiscal, and regulatory regimes. Both of these are global questions. So is the third reason—the shortage of people, equipment, skills, and commodities—to which I will return in a moment.

Refining issues contribute to the tightness in the markets. Though there is a tendency to see this as a U.S. issue, it is really a global problem. Diesel fuel is the fastest-growing oil product worldwide; over the last ten years, transportation diesel demand grew by 34 percent, while gasoline demand grew by 13 percent. It is the fuel of economic growth in Asia; over half of new cars sold in Europe are diesel. Yet Asia and Europe—the growth markets for diesel—have refining systems that are constrained in terms of producing diesel fuels.

Geopolitics has to be regarded as one of the traditional fundamentals, for in one way or another it has always had a major impact on the oil market. Geopolitics can make its influence felt through disruption or through fears and perceptions of risk regarding the reliability of supply.

We do not today have the mega-disruptions that were characteristic of the 1970s. However, when you add up various kinds of disruptions, you get an "aggregate disruption" of between two and three million barrels per day. Particularly noteworthy is Nigeria, one of the key exporting countries and one particularly important to the United States. For the past few years, 20 to 30 percent of Nigeria's output disrupted by rebel attacks. Currently, almost a million barrels a day of Nigerian oil has been removed from the market—representing a loss of 40 percent of Nigeria's capacity. Venezuela's productive capacity has declined by almost a million barrels per day from its peak. Iraq's production hovers below the pre-invasion levels. Mexico's capacity is declining because of inadequate investment and restrictions on international investment.

The result of all of this is a much tighter market—in terms of the balance between supply and demand—than had been customary for several decades. The tightness can be measured in terms of "spare capacity"—the unused production capacity that can be called upon in case of disruption. As recently as 2002, spare capacity was 5 million barrels per day. By 2005, it was down to one million barrels per day. It

increased to about 2.5 million barrels per day in 2007, but with the recent increase in Saudi production, it is again declining. In a tight market, prices go up. And a tight market is also a market that is more crisis-prone, more vulnerable to the impact of disruptions.

The dangers and uncertainties related to Iran's nuclear program are also a distinctive feature of today's oil market. As Iran's centrifuges whirl, concerns mount about the potential for crisis and confrontation, which could affect not only the reliability of Iranian supplies, but also could affect some portion of the oil passing through the Strait of Hormuz—representing 40 percent of traded world oil. There is clearly an Iranian risk factor in the price of oil today.

The New Fundamentals

What have emerged as the "new fundamentals" are also playing an important role in the sharp upward movement of oil prices.

Doubling of Costs

The first of the new fundamentals is the rapid rise in the cost of new oil and gas fields. Both the public and public policy focus in on price. But the dramatic increases in costs are bedeviling the industry, delaying new supplies, and constitute one of the major reasons for rising prices.

Cambridge Energy and its parent company IHS, which has the world's largest databases on oil and gas reserves and production, have created the IHS/CERA Upstream Capital Costs Index to measure the impact of rising costs. The results are dramatic. The latest analysis shows that costs worldwide have more than doubled over the last four years (See Figure 1).[2] This means that every dollar of investment buys only half of what it would have bought four years ago. To put it another way, companies have to budget twice what they would have for the same project four years ago. Some examples are even more extreme: a deep water drill ship that would have rented for $125,000 per day four years ago now costs $650,000 per day.

Why these cost increases? The reason is that there is an acute shortage of the engineers and scientists, skilled labor, equipment, and of the steel and other commodities that are required to develop new supplies. As a result, the cost of everything that is required to develop new oil and gas fields is being bid up around the world.

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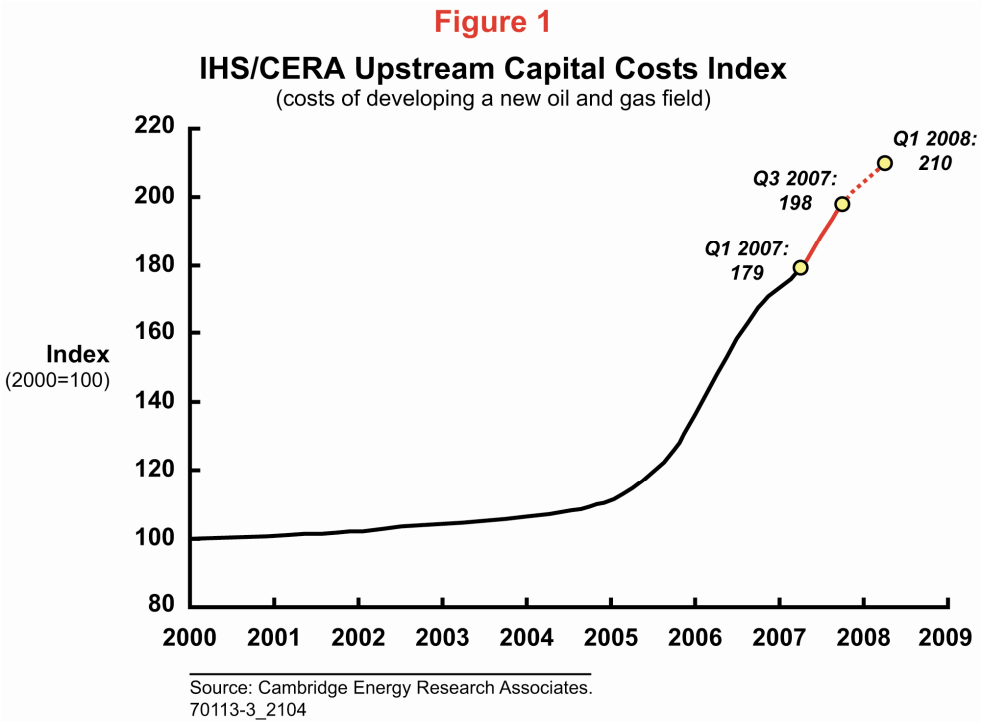
[2] Capital Costs Analysis Forum—Upstream: Market Review, CERA Special Report, 2008.

Figure 1



Why these shortages? In the early 1980s, there was a similar expectation that prices would go sky-high. Then the prediction was of "$100 a barrel oil", which, in today's dollars, would be about $300. Instead, the oil market experienced two price collapses—to $10 oil in the mid 1980s and again in the late 1990s. As a result, the industry went through a contraction, preparing for a long haul of low prices. Indeed, there is a "missing generation" of engineers and technologists in the oil and gas industry. Just as the contraction was more or less finished, demand started ratcheting up again with the strong global economic growth. The industry has been scrambling ever since to catch up with this growth. At the same, overall global demand is driving up the cost of such critical inputs as steel and cement.

The impact of the shortages is two-fold. The first is that projects cost more. Second, the projects are being delayed, postponed, and in some cases cancelled. Thus, the supply response is taking longer, which contributes to a tighter market and helps drive up prices.

At the same time, governments around the world are increasing their taxes and take, adding to the cost squeeze that is constricting supply and putting pressure on the commerciality of new projects.

Oil—the "New Gold": the Integration of the Oil Market and Financial Markets

The second of the new fundamentals might be described as "oil as the new gold." Oil has become a storehouse of value—reflecting broad global economic trends and imbalances. At the same time, oil is increasingly seen as an asset class by financial investors, an uncorrelated alternative to equities, bonds, and real estate. This is a development that has only really emerged in the past few years as more and more financial investors and investment has come into the oil market. The role of financial markets in the oil price, as we all know, is a very controversial subject. There are some who believe that "speculators" are the culprit. There are others who believe that the impact is minor, and that supply and demand largely explain things.

The role of "speculators" in the commercial oil market has received much attention recently. The word "speculator" has both a technical meaning and a colloquial meaning. In the technical meeting, it describes those who trade with the objective of making profit by successfully anticipating future price movements. Speculators add liquidity to the market, taking the other side of trades that allow commercial participants—such as independent natural gas producers, airlines in the oil market, or farmers in agriculture markets—to hedge their risk. In this role, speculators help make markets possible. However, the colloquial meaning of "speculator" has a range of different connotations, ranging from manipulator to risk-taker to those who collectively get caught up in "irrational exuberance" and help generate bubbles. All these are more controversial than the technical meaning. However, the focus on the word "speculator" is too limited.

Financial markets are today playing an increasingly important role in price formation – responding to, accentuating, and exaggerating supply and demand, geopolitics, and other trends.

The interests of financial participants in the oil market are varied. Some are doing what traders do, looking for momentum and trends. Some are doing it as an "alternative investment," to secure, for their pension-holders, sufficient income from assets that generate returns not correlated with the performance of stocks and bonds. Some invest in oil as a proxy for economic growth in China and India. For others, investing in oil has become a hedge against a variety of risks and threats. Some are investing in oil to protect themselves against rising global inflation. A pension fund may invest in oil to protect its portfolio against a possible sharp drop in equity markets in the event of conflict in the Middle East. (One prominent U.S. pension fund recently explained that it was increasing its investments in commodities as part of a "new strategy to provide a hedge against inflation while diversifying investments, thus mitigating losses during equity market downturns.")

And some anticipate a permanent shortage – in its strongest form, the world's "running out" of oil. A "shortage psychology" certainly seems to have become widespread in financial markets as prices have gone up. This psychology is based partly on current market conditions and partly on expectations of tight

markets for many years to come. As prices go up, this psychology becomes self-reinforcing – at least until the market turns.

The U.S. credit crisis and the weakening U.S. dollar constitute a significant factor. For, when the credit crisis broke last summer, the response, as would have been anticipated, was interest rate cuts. These, in turn, led to a fall in the value of the dollar against other currencies, amplified by expectation of further interest rate cuts. Instead of the traditional "flight to the dollar" during a time of instability, there has been a "flight to commodities" in search of stability during a time of currency instability and a falling dollar. While the correlation does not hold week-in and week-out, we believe that this trend—a falling dollar contributing to higher oil prices—is very strong.[3] Figure 2 shows the movements since last summer, and Figure 3 shows how the fall in the dollar has lowered the "euro price" for oil. There is a painful irony here. The crisis that started in the subprime mortgage market in the United States has traveled around the world and, through the medium of a weaker dollar, has come back home to Americans in terms of higher prices at the pump.

II. "Break Point": the New Scenario of World Energy

Prices do not usually go straight up forever. Markets respond to higher prices with behavioral changes, innovation, and substitution, and we are beginning to see that response. Two years ago we envisioned a scenario of $120-150 oil that we called "Break Point." The question was how delays and postponement in the development of supplies, combined with disruptions, could drive prices up to that $120-150 level.[4]

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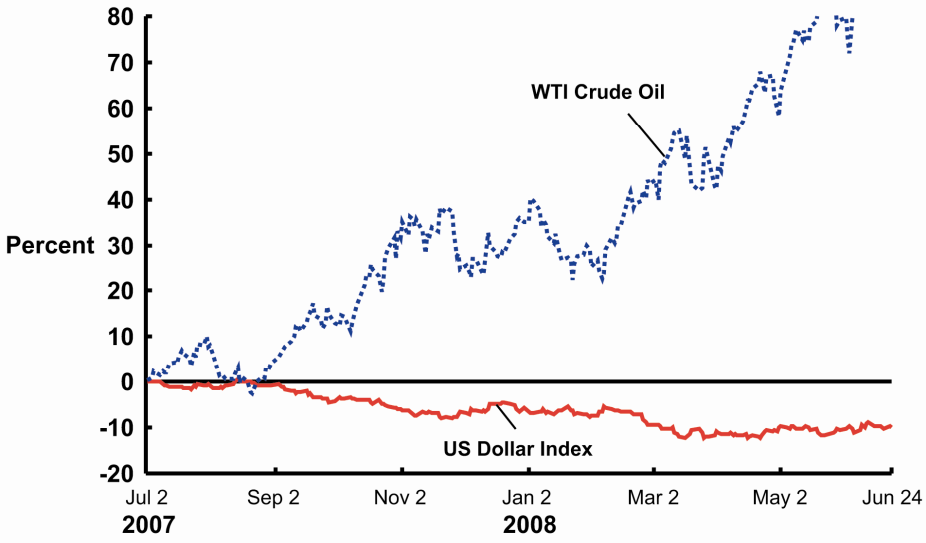
[3] The Federal Reserve Bank of Dallas estimates that "exchange rate movements accounted for roughly a third of the $60 increase in oil prices from 2003 to 2007." Stephen P.A. Brown, Raghav Virmani, and Richard Alm, *Economic Letter—Insights from the Federal Reserve Bank of Dallas,* May 2008, p. 6. It notes that the dollar has fallen 46 percent against the euro since mid-2001.

[4] Break Point Revisited: CERA's $120 - $150 Oil Scenario, CERA Special Report, 2008.

Figure 2

Dollar Decline and Oil Price Rise



Source: Cambridge Energy Research Associates.
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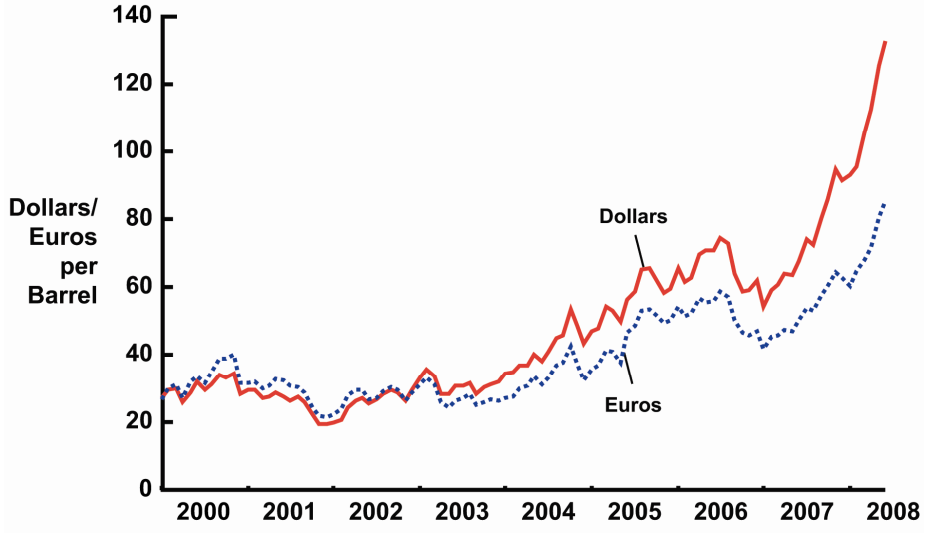
Figure 3

WTI in Dollars and Euros



Source: Cambridge Energy Research Associates.
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But the real focus in the scenarios was on the response. Today, we are seeing the beginning of a powerful response in terms of public policy, technology, consumer behavior, and company strategies:

- The first increase in automobile fuel efficiency standards in 32 years.
- The sharp shift towards fuel economy in the minds of consumers when they enter an auto showroom.
- The changes in behavior—whether measured in use of public transport, carpooling, consolidation of trips, or miles driven.
- Increased focus by companies on reducing their energy costs.
- And, of great significance and lasting importance, changes in the automobile engine itself and the accelerating speed with which automakers are trying, at great cost and in very difficult circumstances, to shift their model mix.

As the Committee knows, there is much talk about "peak oil" supply these days. However, we think something else is at hand— "peak demand" —at least in terms of U.S. gasoline consumption. In our view, 2007 may well have been the top, the peak, in terms of U.S. gasoline demand.[5] Both because of changes in the minds of consumers, and the response of automakers in terms of the efficiency of vehicles, gasoline demand may well now be in decline. (See Figure 4). This has worldwide effects. For the 9-plus million barrels of gasoline that the U.S. uses every day is larger than the total oil consumption of any other nation, including China.

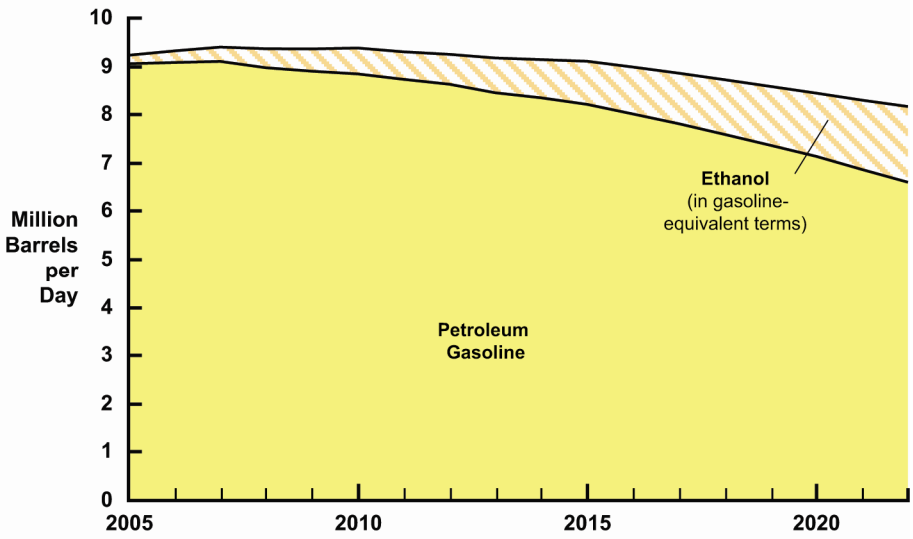
III. The Bounty of Energy Efficiency

One of the most important consequences of the Break Point scenario is the new focus on energy efficiency. It was the potential of energy efficiency—conservation—that first drew me into energy research. It is striking that the United States today uses only about half as much energy per unit of GDP as in the 1970s. Some of that represents restructuring of the economy towards services. But much of it represents actual gains in efficiency.

[5] Drivers Turn the Corner in the United States: Gasoline "Peak Demand," Sooner than Expected, CERA Decision Brief, 2008.

Figure 4

US Gasoline Demand: Break Point Scenario



Source: Cambridge Energy Research Associates,
US Energy Information Administration.
Note: This calculation assumes that the biofuel goals set in the Energy Security and Independence Act of 2007 are met.
80515-10_2805

The reality of the current oil shock behooves us, as a nation, to consider what would be required to double our energy efficiency over a certain number of years. Today, there are tools in terms of information technology to support greater energy efficiency that were simply not available in earlier decades. In terms of the nation's gasoline consumption, savings of 7 to 10 percent—as much as 900,000 barrels per day—may be available with little or no penalty or burden on drivers.

Of course, "energy efficiency" is not a "thing", unlike a power plant, an oil well, a windmill, or a solar panel. It is embodied in other things—changes in behavior, in technology, and in the capital stock. It can be stimulated by regulations, information, and prioritization. But, in a market system, price itself is a powerful driver, and energy efficiency will get much higher priority now than in years when energy was cheap. It is not surprising that sales of SUVs and other light trucks took off in the late 1990s. In 1998,

owing to the collapse in crude prices, gasoline prices were the lowest in real terms that they had ever been.[6]

Climate change considerations will be a further driver of energy efficiency, for it offers the largest near and medium term way to reduce CO_2 output.

One is struck by how energy efficiency is gaining traction and support across the spectrum. As such, it will help us overcome the "either-or" approach and will be one of the key contributors to underwriting the energy response on which our nation's prosperity depends.

IV. Some Approaches to Policy

Avoiding "Either-Or"

So often, it has seemed over the decades, U.S. energy policy divides into an "either-or" debate, which sets conventional supply against renewables and conservation—as though one partial approach or another is sufficient. This is unfortunate. We need a more ecumenical approach, and indeed a portfolio strategy. Our $14 trillion economy runs on 100 quadrillion BTUs of energy per year—50 million barrels of oil equivalent per day (of which actual oil is currently somewhat over 20 million barrels per day).

Alternatives and renewables have and should have an important role to play in our energy economy, and their role will grow. *Crossing the Divide* outlines how that could happen.[7] But we also have to keep in mind the overall scale of our energy needs, costs, and time. A great deal of effort is going into innovation, and the impact will be significant. But the timing and scale remain uncertain. And, as renewables grow in scale, the question of how they are integrated into the existing energy infrastructure becomes more important.

Today, oil and natural gas together represent a little over sixty percent of our total energy consumption. Most of the rest are coal and nuclear. Renewables are about six percent; most of that is biofuels and hydropower. Given these proportions, and in light of today's high prices, it is urgent to ask how to ensure the adequate supplies of oil and natural gas supplies that are needed on an environmentally-sound basis and at a price that does not damage the overall economy.

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[6] Gasoline and the American People: 2007, CERA Special Report, page 6.

[7] Crossing the Divide: The Future of Clean Energy, CERA Muticlient Study, 2007.

Encouraging Timely Investment

The current oil shock underscores the need to encourage timely investment across the energy spectrum that will relieve the price pressures—both in the United States and abroad. Investment has to be stepped up in order to play a vigorous game of catch-up with a growing world economy. That, in turn, requires efficient and timely decision-making, whether in the United States or in resource-holding countries, as well as the facilitation of large, complex projects that bring on significant new supplies. An excellent example of the impact that engagement can make is the strong support that the U.S. gave to the Baku-Tiblisi-Ceyhan pipeline that carries oil from Azerbaijan through Georgia to Turkey. Without that pipeline, there would not be 700,000 barrels of Caspian oil flowing through to the Mediterranean today—and the addition to energy security that those supplies provide.

The Role of Markets

Markets themselves, with their decentralized decision-making, generally provide faster and more effective mechanisms for responding to high prices and shortages than systems of price control, which can have unintended and very painful consequences. The classic example is the contrast between the much-remembered "gas lines" of the 1970s and the surprisingly swift response to the disruption of Hurricanes Katrina and Rita in 2005—which constituted the largest energy disruption that the United States had ever experienced. The 1973 and 1979 gas lines were largely self-inflicted—the result of price controls and an allocation system that determined where gasoline supplies would go. There was little flexibility to move supplies to where they were most needed. Bureaucratic decision-making at the center could not possibly keep up with the changing character of the marketplace. Thus, gasoline was available in rural areas; there was just not enough gasoline in cities to get motorists out to the countryside so that they could fill up.

The response in 2005 was quite different. Mild relaxation of regulatory restrictions—on which gasoline grades were required in which cities, and on the Jones Act, which required that oil shipped from one U.S. port to another U.S. port be in American ships—meant that supplies were moved around efficiently, and prices subsided much more quickly than anticipated. (This was supported by release from the Strategic Petroleum Reserve and similar reserves held by other countries). The fears—such as gas lines spreading across the nation and airports running out of jet fuel—did not come to pass.

The U.S. and Global Markets

The United States is more integrated into the global marketplace than in years past, and yet it has less leverage over the market. Our oil imports today are twice what they were in the 1970s. Yet our share of world markets is less. In the 1970s, the U.S. represented 30 percent of world oil consumption. With

economic growth elsewhere, the U.S. share is down to 24 percent. The balance is changing in other ways. National oil companies—which vary greatly in their character and capabilities—control over 80 percent of world oil reserves. The five "supermajor" oil companies account for less than 15 percent of the world's total oil production. China and India are now significant players in the market. The list of shifts goes on.

The realities of the global markets and America's integration into them emphasize the need for a cooperative, multifaceted approach to relations with both producers and other consumers and put a premium on how we manage, think through, and structure our relations with other countries.

Price and Expectations

The final point to consider is the role of expectations. As suggested earlier, much of the conviction and buying in those markets where oil and finance intersect is due not only to the short-term—the latest disruption in Nigeria, the ratcheting up of tension over Iran's nuclear program—but also due to current expectations about very tight supplies three or five years down the road, particularly because of the anticipated high growth in countries like China and India. These longer-term expectations feed back into current prices.[8]

To be sure, in the current tight, crisis-prone market, prices would likely spike higher if there were a major disruption—or even imminent threat of such—particularly in a key region such as the Persian Gulf. Fortunately, we do have an emergency system built around the International Energy Agency that was created to respond to such crises.

But that more general expectation of very tight supplies is based upon the assumption that the global market cannot generate the responses that are warranted—in terms of demand and efficiency, in terms of new supplies and timely investment, and in terms of renewables, new technologies and alternatives. Delays and postponements are read as predictions of shortages. Meanwhile, developments of great importance—such as the very large discoveries in off-shore Brazil—get relatively little attention. Downward shifts in future demand from what would have been anticipated two years ago, are discounted.

The oil and gas industry is a long lead-time industry. New fields can take five to ten years to develop. But their impact is anticipated earlier in the price. A major contribution to alleviating today's oil shock would be to create an environment, based upon realistic assessments, that ensures that timely investment is really and convincingly on the way.

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[8] The importance of longer-term expectations is also emphasized in the Dallas Federal Reserve's *Economic Letter.*

The answer to the oil shock is not "either-or". We need an ecumenical approach—a combination of new supplies, renewables, and greater efficiency—all developed with appropriate environmental and climate change considerations in mind.

Such an approach would be a great contribution not only to relieving the pain and pressures that the American people are feeling at the pump and the difficulties that are faced today by American businesses, small and large alike. It would also be a fundamental contribution to the future prosperity of our nation and to the global economy of which we are so centrally part.

Daniel Yergin is Chairman of Cambridge Energy Research Associates. Dr. Yergin is the author of *The Prize: the Epic Quest for Oil, Money, and Power*, for which he received the Pulitzer Prize, and of *Commanding Heights: the Battle for the World Economy*. He is writing a new book on energy and geopolitics, which will be published by Penguin in 2009. He is also executive vice president of IHS, the parent company of CERA.