

**THE LONG AFTERSHOCK: OIL AND ENERGY SECURITY
AFTER THE PRICE COLLAPSE**

**TESTIMONY TO THE JOINT ECONOMIC COMMITTEE
OF THE U.S. CONGRESS**

PREPARED REMARKS

Dr. Daniel Yergin

Chairman

IHS Cambridge Energy Research Associates (IHS CERA)

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Daniel Yergin is Chairman of IHS Cambridge Energy Research Associates. Dr. Yergin received the Pulitzer Prize for his work *The Prize: The Epic Quest for Oil, Money and Power*, which has been translated into 17 languages and appears in a new updated edition in 2009. His book is *Commanding Heights: The Battle for the World Economy* has been translated into 13 languages. He is writing a new book on energy and geopolitics. He chaired IHS CERA's most recent study, *Growth in the Canadian Oil Sands: Finding the New Balance*. Dr. Yergin is a member of the National Petroleum Council and vice chair of its "Hard Truths" study. He is a board member of the United States Energy Association. He serves as CNBC's Global Energy Expert.

Dr. Yergin received the United States Energy Association's Award for "lifelong achievements in energy and the promotion of international understanding." He is a Trustee of the Brookings Institution, a Director of the New America Foundation and of the US-Russia Business Council, and on the Advisory Board of the Peterson Institute for International Economics and of the MIT Energy Initiative.

Dr. Yergin received his BA from Yale University and his PhD from Cambridge University, where he was a Marshall Scholar.

I want to thank Chair Maloney, Vice Chair Schumer, Ranking Member Brownback, and the entire Joint Economic Committee for the invitation to participate in this timely hearing. Midst the crowded and pressing economic agenda, the Committee is to be commended for its focus on energy during a period of lower prices. For the issues of energy prices and availability are integral to our nation's economic well being, its security, and to the safeguarding of the environment.

When I had the opportunity to testify to the Committee almost a year ago, oil prices were on a sharp upward trajectory. Sixteen days after that very timely hearing, oil prices reached an all-time peak of \$147.27. Although some people were then talking about \$200, \$250 or \$500 a barrel oil, it seemed clear at the time to us at IHS CERA that a "break point" was nearing on prices that would mark the beginning of a reversal—which we have since seen.

It is noteworthy that the peak price day, July 11, was more than two months before the historic morning of September 15, 2008, when the collapse of Lehman Brothers took the economy from "moral hazard" to the far more frightening world of "systemic risk"—credit freeze, economic free fall, and the threat of overall breakdown.

It is well-recognized that the main driver of the deepest recession since the Great Depression was the failure in the U.S. and global debt and credit systems. But the surge in commodity prices—notably oil—was a very significant contributing factor. These high energy prices hit consumers hard, especially lower-income consumers, constraining their budgets and reducing their spending. They also put an unexpectedly heavy burden on many businesses, large and small—including airlines. Most notably, the very high oil prices did much to knock the automobile industry flat on its back—both reducing the ability of people to buy cars and leaving Detroit stranded with a product mix that could not quickly change at a time when consumers were moving away from the existing product mix at very high speed.¹

The experience over the last two years underlines the wisdom of the Committee in looking out beyond the recession to how the oil market and the overall energy picture will evolve in the future.

¹ IHS CERA, "*Recession Shock*" *The Impact of the Economic and Financial Crisis on the Oil Market*, December 2008. Our view concurs with that of Professor James Hamilton, who writes, "It is clear that something other than housing deteriorated to turn slow growth into a recession. That something includes the collapse in automobile purchases, slowdown in overall consumption spending, and deteriorating consumer sentiment, in which the oil shock was indisputably a contributing factor." James Hamilton, "Causes and Consequences of the Oil Shock of 2008-2009," February 2009.

Today, I would like to address three questions:

1. ***How and why did the oil market move so quickly from the Demand Shock, with very high prices, to the current Recession Shock?*** The answer demonstrates the way in which oil prices are a barometer of the world economy; for the number one reason is the shift from the “best global economic growth in a generation” to the “deepest recession since the Great Depression”.
2. ***What are the prospects for another shock—what we call the Long Aftershock—in terms of lower investment and what might this mean in terms of sharp future increases in price?*** What will be the effects on future demand and supply, on investment, and on energy security? Spare production capacity—already at about 6.5 million barrels per day—will increase in the short term due to falling oil demand and increasing supply from investments already under way. In the medium term, however, low prices and financial constraints will hinder investment. Consequently, as the economy picks up, spare capacity will start to erode, and the oil market could tighten again in the first half of the next decade. Another era of strong global economic growth would also accelerate tightness. The result could be another adverse shock to the U.S. economy and global energy security.
3. ***What are the implications for what has become a critically important source for U.S. energy security—Canada’s oil sands—and the issues around them?*** Our new IHS CERA study, *Growth in the Canadian Oil Sands: Finding the New Balance*, addresses some of these questions.² In talking about U.S. energy security, particular attention has to be given to Canada, which is the source of almost 20 percent of our total oil imports, as well as significant supplies of natural gas, and is also the largest buyer of U.S. exports of goods and services. The study also seeks to put the GHG emissions of the oil sands in a comparative framework, showing that on a “well-to-wheels” framework, their emissions are 5 to 15 percent higher than the “average” barrel.

² IHS CERA Special Report, *Growth in the Canadian Oil Sands: Finding the New Balance*, May 2009.

The Reality of Cycles

The essential point is the reality of cycles. Decisions made by governments and companies today will affect the availability of supply half a decade from now. The recession will not last. Nor will the large overhang of supply. That is why it is so important to focus on the energy future. Major initiatives are now being launched by the U.S. government to help further diversify and strengthen our energy system—from smart grids and transmission, to electric batteries for cars, to renewables and alternatives. There is also the opportunity to make real advances in the efficiency with which we use energy. Altogether, there will be a significant impact from the new commitment to much larger and more sustained research and development that will bring talent, existing and new, to work on our energy problems.

But we still face the challenges of lead time and scale. Currently, our total national energy use is the equivalent of 46 million barrels of oil a day. Even if the medium and long-term ambitions for electrification of our auto fleet are fully achieved, it will take some years for this impact to be felt. We will have a more efficient automobile fleet in terms of the internal combustion engine, augmented by yesterday's announcement of the accelerated fuel efficiency standards. Even so, that too will take time. Meanwhile, the major growth in oil demand will characterize emerging markets. We are already there. New sales of automobiles in China have, during this deep decline, exceeded those in the United States for each of the last three months.

Once global economic growth resumes, so will growth in oil demand. And that will once again put energy security—and the relation of energy to economic well-being—back at the top of the agenda. Given the lead times to develop new supplies, policy decisions made today should take into account the likelihood of future cycles—and what they mean to the American economy and to American consumers.

Beyond "Either-Or"

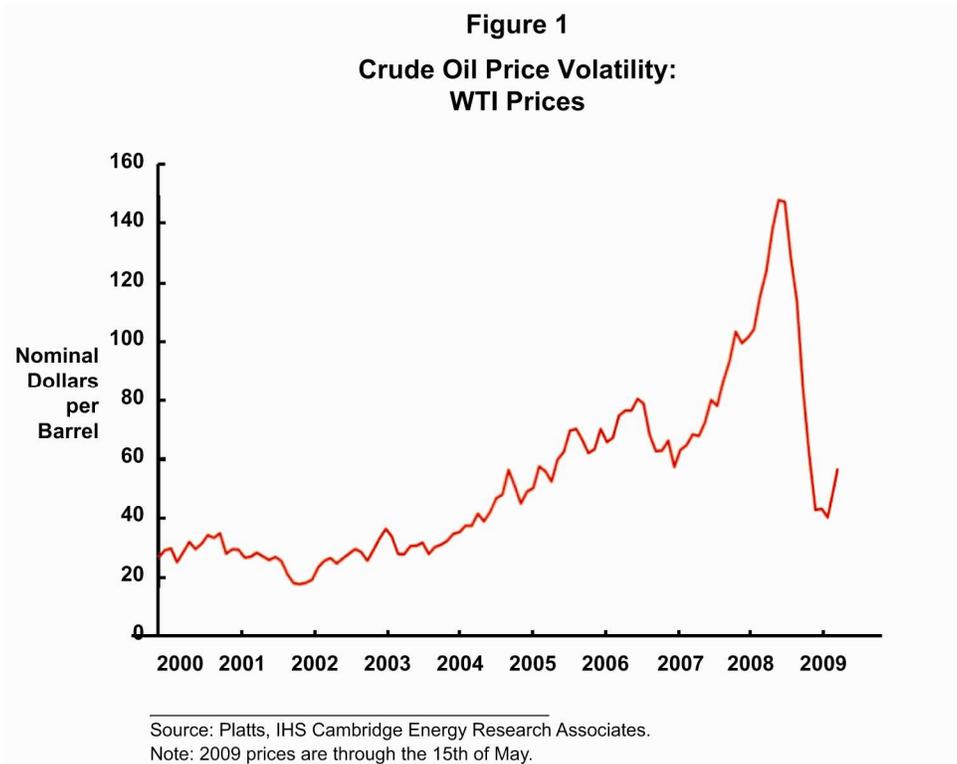
As part of that longer-term view, we need to get beyond the "either/or" energy debate and take a more ecumenical approach—ensuring that a combination of conventional energy, renewables and energy efficiency are all developed with appropriate environmental and climate-change considerations. As already noted, the major initiatives in research and development, innovation, and the "green stimulus" can have significant long-range impact. Moreover, the new recognition of the potential for energy efficiency is wholly welcome. Indeed, we have never seen anything like the embrace of energy efficiency that is taking place today all across the spectrum. But there is no single answer to the energy needs of our \$14 trillion economy. Today, fossil fuels—oil, natural gas, and coal—supply over 80 percent of our total energy. Oil by itself is about 40

percent. That alone makes clear the importance of oil—and the evolution of the oil market—to our economy and security in the decade ahead. That is precisely why the focus of this Committee today is so significant.

How Did We Get Here? From Demand Shock to Recession Shock

The last two years have seen extraordinary volatility in oil prices—scaling heights approaching \$150 per barrel followed by a plunge to less than \$40 per barrel and now rising back, at least for now, into the high \$50s. (See Figure 1)

Oil prices are a barometer of the world economy. Rising prices between 2003 and 2007 reflected the best global economic growth in a generation—growth that led to overleveraging in terms of debt on a global scale, which fueled unsustainable economic growth. This economic growth translated into strong growth in oil consumption, especially in emerging markets. This was the Demand Shock. Between 2003 and 2007, oil demand grew by 7.6 mbd—compared to 4.3 mbd growth in the preceding five years. With this surge, the balance between supply and demand tightened.



While demand was rising sharply in these years, supply was affected by a variety of disruptions—sometimes in aggregate by as much as 2 million barrels per day (mbd), or even more.

Then there was the timing of investment. The oil industry is a long-term industry with regard to its investment horizons. It can take 10 years or more to find, develop and start production from a new field. Thus, there is no quick supply response. As it turned out, there were also delays in stepping up investments in new capacity, arising from several factors. There was skepticism about the durability of high and rising prices. Resource-holding countries tightened their terms for investment; and, as their financial reserves grew, they felt less urgency to encourage new investment.

Moreover, there was a dramatic increase in the costs for upstream, downstream, and energy-related services to more than twice their level at the start of the decade. This cost issue, while very prominent within the energy industry, was largely unrecognized outside the industry. But a series of IHS CERA cost indices clearly established their impact: The cost of developing a portfolio of upstream assets more than doubled from the beginning of 2005 to late 2008. What this meant was that a dollar of investment only bought half as much in 2008 as it did in 2005. That too slowed down the investment response.

The tightening balance between rapidly-growing demand and more constrained supply created a shrinking of “spare capacity”—the production capacity not in use—to as low as one million barrels a day in 2005. This is a very tight balance for the oil market, and the inevitable response is higher prices.

But the tight balance between supply and demand in 2003–07 was not the only factor driving the increase in oil prices. Prices were also caught up in an increasingly unsustainable commodity boom. The final explosion in oil and other commodity prices began late in the summer of 2007—as a weakening dollar set off a “flight to commodities” and there developed an increasing emphasis among investors on oil and other commodities as an asset class and storehouse of value. This was the period when financial markets had their greatest impact on oil prices—reflected variously in hedging, speculation, and asset allocation. High oil prices in turn played, as already noted, an important contributing role as a trigger in the economic downturn by undermining consumer spending and confidence, by burdening businesses, and by hitting hard at certain industries, notably automobiles and airlines.

In addition, a triad “belief system” evolved that supported the rise to \$147 oil. The first element was a belief in what became known as “decoupling”—the conviction that the world economy had evolved to the point where Europe and emerging markets would be insulated or even immune

from a US economic downturn. That conviction lasted right through the summer of 2008 and was only jettisoned with the truly global downturn that became so evident in the autumn of 2008. The second was the widespread embrace of various versions of “running out” theories—that the emerging markets would consume all the world’s marginal resources or that the world had hit “peak oil.” The third element was an underlying, if unstated, assumption that price did not matter -- that both demand and supply would not budge as prices soared. Yes, it was possible that price had become irrelevant, but this would have been the first time in economic history. As it turned out, prices did matter. They just had lags—meaning it took some time for their impact to work their way through the system and be recognized.

Rise of Spare Capacity

But now the Demand Shock has completely given way to the Recession Shock. What had seemed unthinkable to many—declines in global demand—have become reality. The fall in oil demand in 2008 (0.7 mbd) and what we expect as the decline in 2009 (2.2 mbd), means a total decline of 2.9 mbd. This wipes out the oil demand growth over the last 4 years, and takes us back to the global demand level pre-2005.

Oil prices are half of what they were a year ago. As demand shrunk, new supply continued to come into the system. As a result, the formerly tight balance between world oil demand and the world’s capacity to produce oil has given way to the largest volume of surplus production capacity in 21 years—about 6.5 million barrels per day. We are back to 1988 in terms of spare capacity. The oil market, like the broader global economy, has undergone a sea change. Today’s oil prices are once again showing us a barometer of a weak global economy.

In the near term, this amount of spare capacity provides a significant cushion of security. Most of this decade saw the oil market’s shock absorber—spare production capacity—shrink to the point where any actual supply disruption—or fear of one—pushed prices higher. This supply anxiety was part of the price. With spare capacity this year expected to average about 6.5 mbd—up from 2.5 mbd last year—fears of a disruption leading to a supply shortfall are considerably reduced. The current spare capacity is equivalent to the combined total output of Iran and Venezuela—or the combined exports of Iran,

Venezuela, and Nigeria together. This is important because these three countries have led the headlines when it comes to the geopolitical risk premium in oil prices during this decade. This is a major contrast to the period of tight capacity of the previous few years.

One result of this kind of shift is that energy security tends to slide down the agenda and fall away as a concern. In reflecting on this for the new edition of *The Prize*, I sketched out how the

focus on energy security fluctuates with the market. But, even in this down market, the energy security agenda deserves continuing attention. Two new requirements for global energy security are the inclusion of China and India in the energy security system, and greater concentration on the physical security of the supply chains and infrastructure.³

The Long Aftershock: When will the Market Tighten Again?

With the build-up of spare capacity, concerns are shifting to the demand and supply balance in the next 3 to 5 years, when the impact of today's lower oil prices on investment could result in what CERA calls the *Long Aftershock*—a tightening balance between world oil demand and production capacity and rising oil prices.⁴

Why has spare capacity increased just as oil prices collapsed from a record high last July? Oil demand can—and does—change abruptly in response to shifts in global economic conditions. Oil production capacity, however, does not. New capacity additions in 2009—including one of the largest ever recorded in Saudi Arabia—reflect investment decisions made several years earlier when prices were high and world oil demand was strong. In fact, in 2009 capacity is actually increasing by over 2 mbd as demand contracts by over 2 mbd.

The long lead times needed to bring new oil-producing capacity online mean that production capacity is expanding amid the biggest downturn in demand in a generation. This overhang of spare production capacity discourages further investment and simultaneously puts downward pressure on oil prices.

Investment decisions are rooted in expectations about future value. A company's investment strategy depends on its long-term view on future oil prices. This view—whether \$20 or \$100-plus per barrel—shapes investment decisions. Long-term oil price expectations are critical, but so is the other side of the coin: upstream development costs. Over the life of a project, \$50 per barrel oil is not necessarily less attractive than oil at \$80 per barrel—at least from the perspective of an international investor.

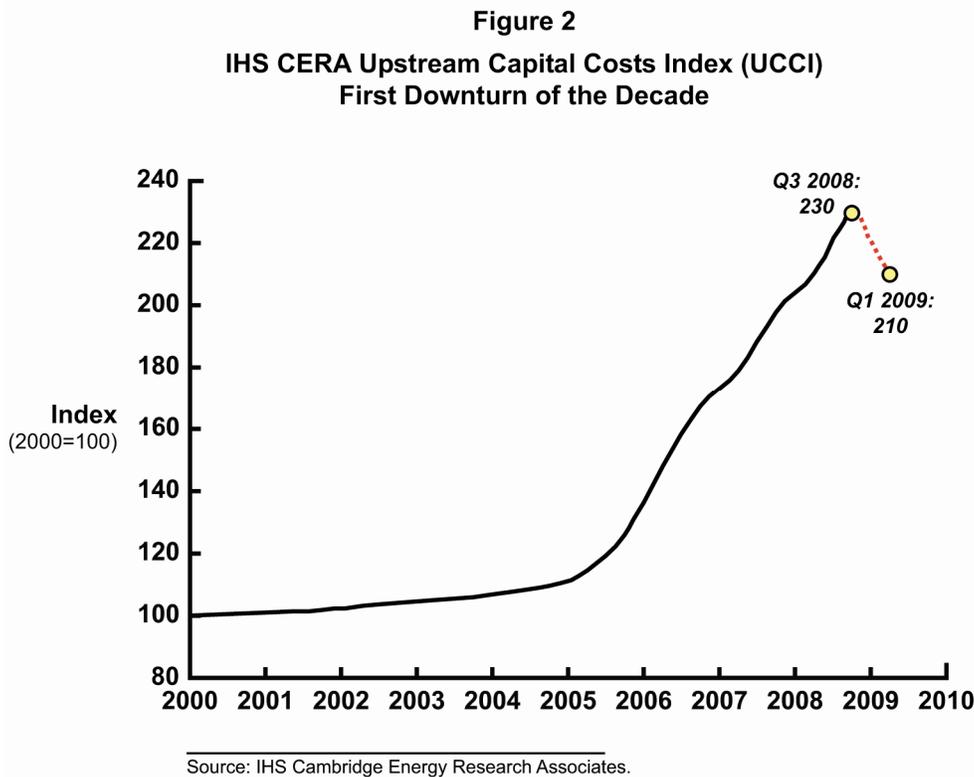
3 Daniel Yergin, *The Prize: The Epic Quest for Oil, Money, and Power* (New York: Free Press, 2009), Epilogue, new edition.

4 IHS CERA Private Report, *The Long Aftershock: Project Deferrals Put 7.6 mbd of Production Capacity Growth at Risk*, March 2009

What matters to a company is how development and operating costs measure up to the oil price and the specific fiscal terms that govern a project. In other words, what matters is the project's expected rate of return, which is determined by revenue, costs, and fiscal terms.

For oil companies, the last year has seen oil prices tumble by more than \$100 per barrel at times, but the cost of developing new oil fields, by comparison, has seen a much slower decline. Oil prices in the first half of May were 63 percent lower than their peak, but costs are down only 9 percent. (See Figure 2) With prices at much lower levels than a year ago, and industry costs still stubbornly elevated, a number of new supply projects are no longer economically attractive.

In addition to challenging economics, the large amount of excess production capacity brought on by decreasing demand hinders new development projects. Even projects that look like winners today may not proceed—because short-term cash flow problems and tight credit markets limit the amount of capital available for investment. For these reasons, some deferral of investment in oil producing capacity is inevitable. Also, in a more-relaxed oil market, obstacles to new investment may be tougher to overcome.



The vital question is, how much will investment decrease? IHS CERA has attempted to answer that question by considering the economic outlook for oil projects around the world and estimating which ones are at risk in today's environment. The analysis shows that slightly more than half of the expected growth in oil production capacity over the next five years is "at risk" of deferment or cancellation in today's economic environment. About 7.6 million barrels per day, out of potential net growth of 14.5 million barrels per day, may not materialize due to the economic downturn. The emphasis is on "at risk". They may go ahead, they may also be postponed or delayed or cancelled altogether, but they cannot be counted upon.

How Soon?

The long lead times for exploration and development of new oil fields means that a slowdown in investment today will be felt in coming years. However, eventually economic growth and growth in oil demand will return and the market will tighten. But how soon will this happen? On the supply side, it will depend on the extent of cutbacks in oil capacity investments. On the demand side, it will depend on the speed and strength of the world's economic recovery, and on the results of energy efficiency, "green stimulus," and climate change measures designed to decrease energy demand, increase supplies of renewable energy, and decrease the world's emissions of greenhouse gases.

Some things are fairly predictable. The future U.S. automobile fleet will be more efficient. As automakers retool and as buyers return, the impact of the new fuel efficiency standards passed in December 2007—the first in 32 years—will make their impact felt. Yet auto sales will grow substantially in other parts of the world, which means more vehicles will need fuel. If exploration and investment decrease too much today, we envisage a situation where even moderate demand growth could bring about tight oil market conditions, setting the stage for another cycle of strongly increasing oil prices. How high prices get will be determined by the fundamentals of supply and demand, geopolitics and disruptions, government policies, costs, and the interests of investors. They will also be affected by how long memories last in the minds of policymakers, industry decision makers, and investors—about cycles and about how the balance of supply and demand changes.

If, however, future demand does not recover lost ground, the market could be in for a long period of low prices. A long-term overhang of spare capacity is possible if oil demand reductions move from a temporary response to a long slowdown brought on by extended economic malaise. In this case, demand increases and field declines would only slowly, and over many years, reduce the amount of spare oil production capacity available in the market.

All this underlines the reality of cycles. During this downturn, there is a natural tendency for memories to fade about the acute concerns of a year ago—and the impact of such dramatic price increases as seen in 2007 and 2008. But it is important to keep a longer term perspective that accords with the longer-term investment horizons and the long lead times that are inherent in developing oil and other energy resources.

Canadian Oil Sands and the Fabric of U.S. Energy Security

One resource that has become increasingly important to U.S. consumers is the oil sands of Canada. The Canadian oil sands encapsulate many of the challenges facing the world oil industry today. The oil sands give Canada the world's second largest recoverable reserve of petroleum—currently estimated at 173 billion barrels. This is second only to Saudi Arabia. Technological advance has made possible a more than doubling of production from 2000 to 2008—to 1.3 million barrels per day. This has turned the oil sands into an increasingly important source of world oil supply, and they are a key reason why Canada is now the largest foreign supplier of oil to the US market—representing close to 20 percent of our total imports. Canada is one of only two Western Hemisphere countries among IHS CERA's "O-15"—the top 15 countries in terms of supply growth over the next ten years.

Because of their immensity and their adjacency, the oil sands have become a key element in the fabric of North American and global energy security. They are part of the dense network of economic, political, and energy relations (which includes flows of natural gas and electric power) between the United States and Canada. The oil sands themselves are a significant element in the trade links between the two countries. Canada is the largest trading partner of the United States, and Canada is, by far, the largest market for American exports of goods and services.

But investing in the oil sands is a high cost venture. At the peak of industry costs last year, an oil price of roughly \$60 to \$85 per barrel— depending on the type of project—was needed to justify investment. Costs are under downward pressure, but the lightning-quick fall in oil prices means about 70 percent of oil sands projects that were planned last summer have been delayed because of today's low oil prices.

Emissions: 5 to 15 Per Cent More on a Life Cycle Basis

Another major uncertainty is future regulations on greenhouse gas emissions (GHG). Production of the oil sands, like other energy sources, has an impact on the environment. There is much attention to their carbon footprint. The key metric is their life-cycle "well-to-wheel" greenhouse gas (GHG) emissions, which covers all GHG emissions beginning with the production of oil

sands through their combustion in gasoline in the engines of our cars. Oil sands have lifecycle GHG emissions that are 5 to 15 percent greater than the average crude oil consumed in the United States. However, one of the things that became clear in our study is that there is really no “average” barrel. This means oil sands’ GHG emissions can be higher, lower or on par with other crude oil consumed in the United States. Cooperation between the United States and Canada on greenhouse gas regulation would provide a much more stable environment for oil sands investment. Additionally, opportunities exist to reduce the oil sands’ greenhouse emissions—particularly in the realm of energy efficiency—and this is an important area of research and development activity for the Canadian government to lead.

An Ecumenical Approach

The importance of the oil sands emphasizes a larger point: when we think about U.S. energy security, we need to think about resources on a regional and global scale and thus about the importance of diversification. Today, with new policies, the concept of “diversification” is itself being diversified. At the same time, diversification requires timely and steady investment in existing resources, and thus attention to the barriers to that investment.

The scale and complexity of the energy foundation of our \$14 trillion economy underline the importance of an ecumenical approach for meeting the energy challenges ahead.