

Energy Markets Overview

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Energy Markets Overview

Energy investments in 2006 are being driven by three major factors: the need to bring supply and demand into balance; capturing the investment incentives contained in the Energy Policy Act of 2005; and compliance with environmental protection regulations. According to the U.S. Energy Information Administration (EIA), primary energy use in the United States is expected to increase to 134 quads (a quad is a quadrillion British Thermal Units – BTU's) in 2030, up from about 100 quads in 2004. Most of this increase results from petroleum for transportation and coal for electric power production. Energy prices and volatility witnessed the past few years are an indication of the challenge in bringing supply and demand into balance. Weather occurrences, such as Hurricanes Katrina and Rita in 2005, were sufficient to disrupt domestic energy markets. A growing U.S. economy, increasing per capita energy use for transportation and continued digitalization (think electricity) will continue to drive increases in energy consumption.

While energy utilization per dollar of gross domestic product continues to fall, energy use per capita is continuing to rise.

While we are becoming more productive and efficient, increases in energy consumption continue. This is evidenced by personal driving habits. An individual may purchase a smaller vehicle (maybe a smaller SUV), which provides greater miles per gallon than the vehicle it replaces. Often times, the annual miles driven then increases, resulting in higher, not lower, overall consumption. EIA estimates that transportation energy use per capita will increase 15 percent by 2030 over 2004 levels.

U.S. companies are making sizable investments in North American oil and natural gas resources to help meet this demand. Imports of petroleum, refined petroleum products and natural gas in the form of liquefied natural gas (LNG) are expected to expand. Investments in unconventional resources located in North America are expected to significantly expand as well.

Improved tax treatment for certain oil and gas investments are provided in the Energy Policy Act of 2005. Specific provisions affecting depreciation, and amortization along with other incentives amount to about \$2.5 billion. Investment incentives for renewable energy and energy efficiency total more than \$2.5 billion. Specific incentives include

alternative technology vehicles, biodiesel and ethanol, solar equipment, and fuel cells, as well as efficiency investments for buildings and appliances.

Electric power tax incentives include investments in transmission, nuclear decommissioning, production tax credits for new nuclear, clean coal and renewable power generation. All of these incentives are spurring investments in deploying advanced clean energy technology. According to the Chairman of the Nuclear Regulatory Commission, 16 utility companies have plans at some stage of development to build 25 new nuclear units. Meanwhile, investments in transmission lines that totaled \$17 billion from 1999-2003 are expected to be \$28 billion in the 2003 to 2008 timeframe.

Natural gas-related investments, in addition to exploration and production, will include sizable investments in transmission and distribution pipelines. These investments will be needed to maintain existing infrastructure, as well as to build new pipeline capacity. In addition, some number of the 40 proposed new LNG terminals (re-gasification facilities to allow for LNG imports) will be built and will require substantial capital investments.

Major integrated oil companies continue to reinvest profits in bringing more energy resources to market. About \$270 billion was invested in the oil sector in 2004 according to Ernst & Young. The five largest companies accounted for about \$60 billion. ExxonMobil made \$74 billion in investments in the 2001-2005 timeframe, over one-third of which was in North America. The Vice Chairman of Chevron, Peter Robertson (currently Chairman of the USEA Board of Directors) stated at the Chevron Corporation 2006 Annual Meeting, "In 2006, we expect to invest approximately \$15 billion, roughly 34 percent higher than our 2005 level."

Significant investments are also being made across the board to address environmental issues. One company, American Electric Power (AEP), is budgeting \$4.1 billion in environmental investments from 2004 through 2010. A large percentage of this, over 80 percent, is for control of sulfur dioxide emissions. Other electric generation facilities, oil refineries and other facilities are making investments in environmental protection.

Given current investments to meet existing requirements, it is fair to ask what the engineering community can expect over the next 30 years. We have clustered issues derived from the early outcomes of a World Energy Council (WEC) Study, "Energy Scenarios to 2050"; into five global issues. (The WEC Study, which will be released at the Rome Congress in 2007, cites eleven issues). The five mega-issues that we cite are:

- Energy Supply
- Energy Demand
- Climate Change
- Financing
- Public Acceptance

In terms of energy supply, it is generally accepted that an adequate petroleum resource base exists, although obviously the geographic and geopolitical distribution of these

resources have the potential to be troublesome. Some experts predict an imminent “peaking” of oil supplies; and while this may be true for certain fields, overall, substantial supplies exist. Oil resources will be extended by supplementing biofuels as blending agents in gasoline. In addition, the potential to convert coal into liquid or gaseous fuels offers further resources.

Non-conventional resources, oil sands in Alberta and oil shale in the Rocky Mountains are believed to each equal conventional petroleum resources. And it appears that the U.S., and for that matter, parts of Europe and Asia are headed for a nuclear renaissance. While concerns properly exist, and policymakers need to take action to assure that supplies come to market, the traditional, alternative, and renewable resource base is such that the world should have adequate energy resources to meet future demands.

However, supply must be in balance with demand and having adequate resources is irrelevant if those supplies cannot find a way to the marketplace to match energy demand. Energy efficiency has a major role to play for both the near-term and the long-term. The digital economy is helping to electrify all aspects of our society, from industrial manufacturers, to commercial services, to residential applications. These trends are certain to continue.

Meanwhile, one to two billion people have no access to traditional energy resources and another one to two billion have unreliable, inadequate access to electricity and other commercial energy services. The global society must find ways to serve these unmet needs. Sentencing two-thirds of the world’s citizens to continued poverty for several decades to come is unacceptable. Accommodating these needs will require increasing investments in resource development, infrastructure and energy efficiency technologies.

Climate change has the potential to be the wild card of our energy future. While the energy industry in 2006 is not particularly interested in the ongoing scientific debate, we continue to generally believe that long-term voluntary efforts are more sustainable than short-term mandatory measures. There remains some uncertainty regarding various mitigation measures, and most agree that further technological development is warranted. However, it should be recognized that the energy industry is not of a single mind and some thoughtful, responsible industry leaders support continued voluntary efforts while others, equally thoughtful and responsible, are now calling for mandatory measures.

Financing is the fourth mega-issue. The International Energy Agency, (IEA) projects that \$16 trillion will be needed from 2001 to 2030 to meet energy demands. Some countries will lack the ability to borrow on commercial capital markets due to questions about their creditworthiness. Also, questions remain as to whether returns to investors will compare favorably with other economic sectors. Capital flows only to those market sectors where adequate returns are likely. A separate major concern is how the volume of capital investment will effect consumer prices. Will customers tolerate the increased retail prices needed to support these huge investments.

The fifth mega-issue relates to public acceptance. The energy industry can only provide the resources and build the infrastructure that the public, through a democratic political process, will allow. In regard to locating and constructing energy infrastructure, society has evolved from the NIMBY syndrome (Not-In-My-Back-Yard) to BANANA (Build Absolutely Nothing Anyplace Nor Anytime) to NOPE (Not On Planet Earth) to now DADA (Design, Announce, Defend, Abandon).

Supply and demand cannot be brought into long-term balance if energy providers are unable to develop resources and to construct the infrastructure needed to provide energy services. The energy industry is not alone in needing to deal with this issue. New or expanded highways and industrial facilities face similar challenges. We in the private sector must work with governments at all levels to communicate with the citizenry as to why access to energy resources and the ability to site infrastructure is critical to our common future.

The engineering community has an essential role to play in this national conversation. Thank you for having me here today.