Energy Outlook for 2015

It Will Be Here Sooner Than You Think

AT A GLANCE

- Long construction cycle for major energy projects
- Coal in good supply, but use becoming increasingly expensive
- U.S. petroleum needs require more imports
- Natural gas influenced by electric utility needs, LNG development
- Renewables can help, future development uncertain

Let's focus on energy supplies and prices in North America for the year 2015, from the perspective of the industrial facility and process engineer. The first shock is that 2015 is only eight years away. In the energy world, this is a very short period. It is the approximate planning and construction horizon for a major coal-fired or nuclear power plant, or a major petroleum refinery, or the development time needed for a new offshore oil or natural gas field. In many ways, the major supply project decisions that will affect energy supplies for 2015 already have been made.

MANY UNKNOWNS

Events radically change the energy outlook. New technology affects energy supplies as well. Global and national politico-economic events have a radical influence on the energy situation.

We'll look at coal, petroleum, natural gas — the so-called fossil fuels — and renewable resources. Future electric supply and pricing is certainly also a major concern. Trends in the use of the primary energy forms for electric generation have a powerful influence on their availability and price in other markets.

COAL — SUPPLY WON'T BE THE ISSUE

The fossil fuel in longest use and in most abundant supply is coal. North America has hundreds of years' supplies of economically recoverable coal. The downsides to coal are several. It requires expensive equipment to transport, handle and burn. With its typically high sulfur and ash content, it requires extensive treatment to meet increasingly tough environmental standards.

A current concern is mercury emissions from coal. Although particulate removal equipment and scrubbers remove a portion of the mercury emitted by power plants, it is expected that additional emission controls will be required, further increasing the cost of coal combustion. For most industrial energy managers, the chief importance of coal is its potential future use in utility boilers, thereby freeing up premium fossil fuels.

PETROLEUM FUELS

Petroleum-derived fuels are vitally important. It may surprise you that the largest exporter of oil to the United States is not Saudi Arabia, but Canada. Canada produces 3.1 million barrels of oil per day, and uses 2.3 million. The balance is exported. Canada also imports and exports significant quantities of refined products with the United States. The United States produces 8.2 million barrels of oil but uses 20.8 million barrels. The difference is all imported from a wide range of OPEC and non-OPEC countries.

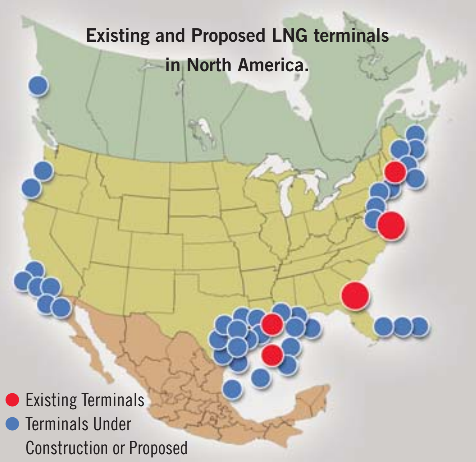
DEMAND FOR OIL STILL INCREASING

The most recent forecasts (2007) by the U.S. Energy Information Agency (EIA) show U.S. liquid petroleum fuel use increasing at a rate of approximately 1% annually through 2020. This takes into account the effects of improving fuel efficiency in all types of equipment and moderate increases in production of non-petroleum based liquid fuels, such as ethanol and bio-diesel. This gradual increase in petroleum use takes place in the face of flat or slightly declining U.S. domestic oil production. Canada has significant reserves of oil, but much of it is in the form of tar sands or other difficult-to-extract resources.

It appears that in 2015 (and for decades beyond), petroleum-based fuels will still be available. Because domestic resources are shrinking, imports are increasing and it is likely that pricing will be even more volatile than it is today.

NATURAL GAS

Obviously, natural gas also is a true premium fuel. Its efficient distribution system, ease of use, low emissions and wide availability have made it the fuel of first recourse for residential, commercial, industrial and utility use. The most recent forecasts (2006) from the EIA



For More Information

Canadian Oil and Natural Gas Outlook
www.capp.ca

U.S. EIA Energy Forecasting
www.eia.doe.gov/oiaf/forecasting.html

U.S. FERC Energy Information
www.ferc.gov

suggest that U.S. usage of natural gas will increase by approximately 2% annually between now and 2015.

U.S. consumption of natural gas is about 22 trillion cubic feet (TCF) per year, of which 18 TCF/year is produced in the United States. The balance is imported from Canada, Mexico and as liquefied natural gas (LNG) from other areas. Canada's usage is about 2.5 TCF/yr. and production is about 3.7 TCF/yr. Most of the Canadian surplus production is exported to the U.S.

According to the EIA, U.S. natural gas production is expected to increase to about 21 TCF/year by 2015, but demand is expected to increase to about 26.5 TCF/yr. This widening shortfall will need to be made up from increased Canadian and LNG imports and perhaps to a modest degree from synthetic natural gas products. Canada expects to be in a surplus position for natural gas for several decades into the future.

LNG BECOMES IMPORTANT

LNG imports will play an increasing role in natural gas supplies. At the present time, there are five operating LNG import terminals in North America, with a total capacity of less than 2 TCF/year. A 2006 FERC report indicates that there are an additional 42 proposed terminals in various stages of construction, approval or preliminary study status.

GAS PRICES WILL CONTINUE SEASONAL VARIABILITY

According to the EIA, the annual average U.S. price for natural gas in 2015 is expected to be between \$5 and \$7 per thousand cubic feet (MCF) in 2005 dollars. Assuming annual inflation rates of 3%, this would mean actual 2015 average annual prices between \$7 and \$9.50/MCF. In recent years we have seen wide seasonal variations in natural gas prices, so your estimates of energy costs need to take into account the times of year of your energy usage.

Wild cards in natural gas availability and pricing include weather fluctuation, environmental regulations, supply disturbances (remember Katrina?), and disruptions in the supplies of other fuels. As the fuel most easily substituted, natural gas usage and pricing can change on a very short-term basis.

RENEWABLES

The renewables that have the potential to make a meaningful contribution to primary energy supplies by 2015 are ethanol and to a lesser extent landfill and agricultural biogas resources.

According to the EIA, ethanol production is expected to increase from 4.0 billion gallons in 2005 to 11.2 billion gallons by 2012 and eventually to 14.6 billion gallons by 2030. This would reduce the need for gasoline refined from petroleum by from five to seven percent in 2015.

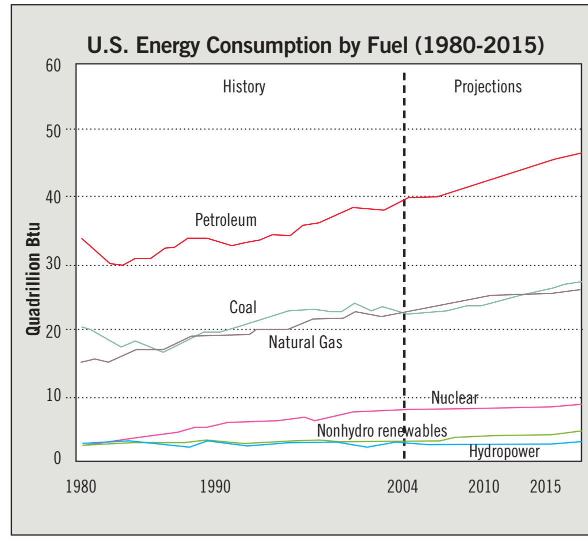
LIMITS TO ETHANOL PRODUCTION GROWTH

Some worry that the expanding production of ethanol from corn puts pressures on costs for corn-based foods and other products. Government mandated limits on production and elimination of current subsidies and special tax treatment could reduce the growth of the ethanol industry.

EIA expects that increases in the production of cellulosic ethanol in the short term will be modest, and this resource is expected to only represent a contribution of 0.3 billion gallons at a time as far away as 2030.

THE ELECTRIC SUPPLY PICTURE

Electric energy supplies and pricing are in some ways even less certain than the primary fuels. Many feel that this industry is beginning to shift attention back to clean coal and nuclear technology for new baseload generation. This would help to control the supply pressure electric utilities put on natural gas and to a lesser extent on petroleum resources.



EIA forecast trends for U.S. energy consumption.

LONG CONSTRUCTION CYCLE FOR BASE-LOAD GENERATION

Yet the planning and construction horizon for major new clean coal or nuclear plants already stretches out to 2015 or even beyond. It seems unlikely that large blocks of new baseload generation will be operating by that time. We can anticipate continuing pressure on natural gas supplies by these hungry utility users.

It would be ideal if we could condense all the forecasts, scenarios and projections into a capsule recommendation. Petroleum is in short supply in North America, and likely to get shorter. New discoveries in the arctic, in the Gulf of Mexico, and elsewhere could ease the shortage, but these are unlikely to be in full production by 2015.

It does appear that we will need new discoveries or import more oil and gas, while slightly increasing our reliance on coal, nuclear,and alternative energy sources. ‹GT›