2015 STATE OIL AND GAS:
PRODUCTION AND PRICE PROJECTIONS

by
Manuel Lam

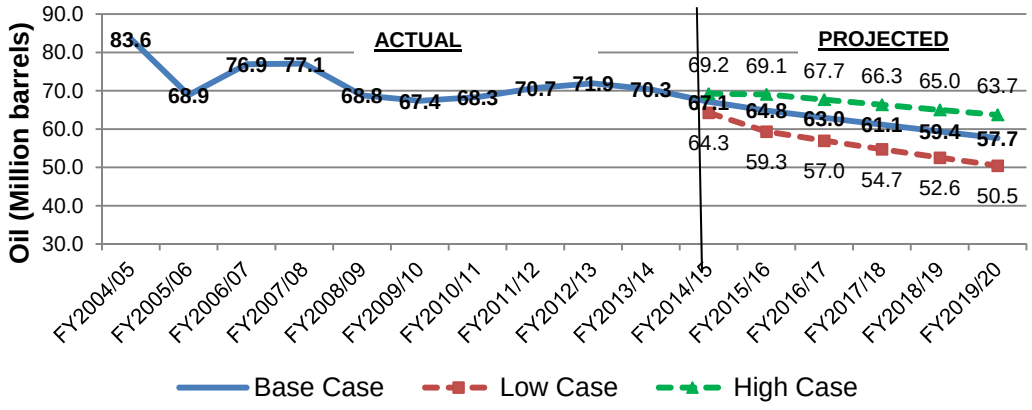
Louisiana has produced oil and gas for more than a century. Oil and gas production are intimately linked with the economy of our state. Presently, Louisiana is the seventh largest producer of crude oil and the third largest producer of natural gas in the U.S., excluding the federal Outer Continental Shelf (OCS) production. Louisiana is also the second in per capita energy consumption. The petrochemical and petroleum refining industries located in the state are the main reason for Louisiana's high-energy use. These industries are extremely energy intensive and rely on Louisiana's abundance of natural resources and historically low energy prices. Despite the location of these industries, the bulk of the final consumption of their products is in other states, as well as overseas.

Following are some other interesting benchmarks in the Louisiana oil and gas production history. In 1910, the first freestanding, above-water, platform was used in Caddo Lake, near Shreveport. In 1938, the first well over water was completed in the Gulf of Mexico near Creole, offshore Cameron Parish. In 1947, the first offshore oil well was completed out of sight from land in Ship Shoal Block 32 (south of Morgan City, Saint Mary Parish). In 1951, the first concrete-coated pipeline was laid in the Gulf of Mexico. In 1954, the state started to produce more natural gas, in terms of barrels of oil equivalents, than crude oil.

In 2006, the Haynesville Shale started producing natural gas, making gas a predominate factor in new production. In 2010, oil production slowly reversed its declining trend due to production from Louisiana oil shale formations and enhanced recovery in mature fields. In 2015, oil and gas productions are expected to resume their decline due to falling oil and gas prices, cheaper production costs in other U.S. oil shale fields, and gas shale fields containing higher gas liquids.

Production Projections

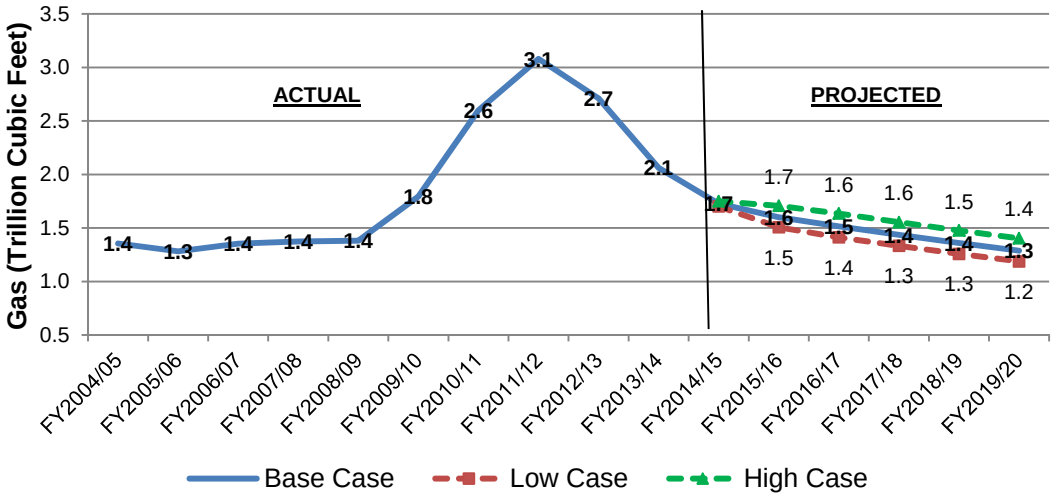
Figure 1. Louisiana Historical and Projected Crude Oil Productions



The Louisiana state oil production, excluding federal OCS, showed an average decline of 2.7% per year over the past ten years, but actual year-to-year change varies widely. Hurricanes Katrina and Rita

caused a 17.57% decline in oil production in FY2005/06; the recovery from the weather disaster and rising oil prices caused increases in production volumes in FY2006/07 and FY2007/08. Hurricanes Gustav and Ike caused a 10.73% decline in FY2008/09. A plunge in oil prices in FY2009/10 kept the production declining. The delayed recovery and new production from enhanced oil recovery in old oil fields increased FY2010/11 production. Production from enhanced oil recovery fields, initial production from oil shale formations, and high oil prices increased production in FY2011/12. In FY2012/13, the falling oil prices slowed the production increase. In FY2013/14, the continuous falling oil prices and production difficulties in the oil shale formations reversed the increase in oil production trend. The Department of Natural Resources (DNR) Technology Assessment Division short-term model is projecting a slight decline in oil production over the next five years, if crude oil prices stay below $100 per barrel and no major weather disruptions occur. Figure 1 shows the projections for the next five years. If prices go over $90 per barrel for an extended period, the projections will be closer to the high case trend, and if the Tuscaloosa Marine shale or the Brown Dense shale productions take off, the above oil production projections will be too conservative.

Figure 2. Louisiana Historical and Projected Natural Gas Productions



Similar to oil, gas production varies from year-to-year, reflecting the severity of weather patterns and prices. In FY2006/07, the Haynesville Shale dry gas field appeared and changed the pattern. For example, the high decline in oil production in FY2008/09 was due to Hurricanes Gustav and Ike, while gas production showed a slight increase. If there had been no hurricanes that year, the percentage of increase in production would have been higher. From FY2008/09 through FY2011/12, Louisiana state gas production has shown percent increases in the double digits. In FY2012/13, gas production dropped 11.97%, caused by a drop in drilling activities. In FY2013/14, production continued to fall due to low prices and competition from other gas shale plays. Figure 2 shows the DNR Technology Assessment Division short-term model projections for the next five years. The projections assume that the weather will be mild without major disruptions and the average gas prices above $3.00 per MCF. In 2012, the gas price fell below $3 per MCF causing a slowdown in drilling activities in the Haynesville Shale areas. There were 93 active rigs in Haynesville areas in January 2012, dropping to 16 active rigs by January 2013, an 82.8% decline. The drop in drilling activities, cutback in production due to low prices, competition from wet shale plays, and overstock of gas in storage curtailed the gas production in Louisiana. In January 2014, drilling active rigs recovered to 40 rigs, caused by rising gas prices, an

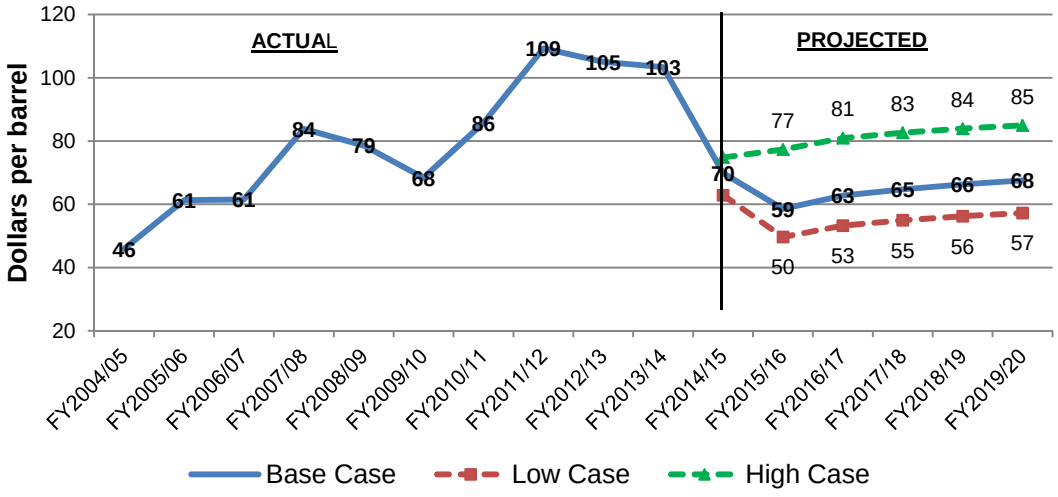
expected demand increase, and exports. In January 2015, drilling rigs dropped to 30 rigs due to declining prices and improvements in drilling techniques.
Factors that contribute to the year-to-year deviations in oil and gas production are:

- Changes in wildcat drilling and development of marginal fields within the state,
- adding new producing areas,
- unstable crude oil and natural gas prices,
- changes in environmental laws, especially those concerning saltwater discharge and the Clean Air Act Amendments of 1990,
- world supply and demand causing a glut or shortage, depending on its growth rate,
- the number of active drilling rigs in the region,
- application of advanced technology, such as 3-D, 4-D, or carbon dioxide injection,
- state and local tax incentives,
- weather patterns, and
- imports/exports.

Price Projections

Oil prices are determined in the international markets and are difficult to project. Just as the historical data shows great swings in the price of oil, there is also considerable uncertainty about future prices. The future price of oil is linked to the unpredictability of world oil supplies and world economics. Major factors affecting oil prices are a) political stability of producing countries, b) world environmental issues, c) industrialized countries' conservation practices, d) weather related demand for petroleum products, e) production restrictions by OPEC countries, f) economic changes in consumer nations, g) stability in the labor force, and h) new producing fields. If crude oil supply and demand for petroleum products are well balanced and refiners have sufficient downstream capacity to process difficult crudes, the price of crude oil will seek a stable market condition.

Figure 3. Louisiana Crude Oil Historical and Projected Prices

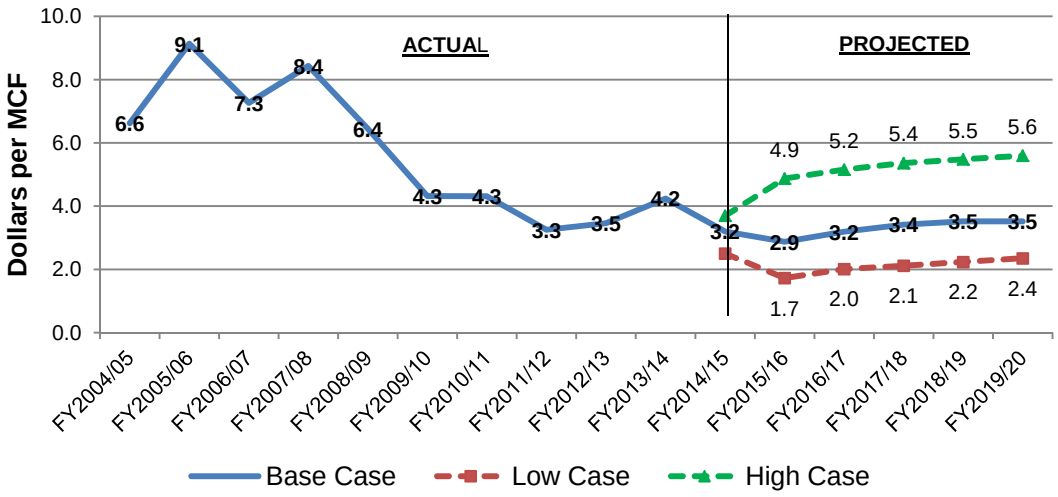


Louisiana crude oil price was over $100 per barrel in the spot market in February 2014, and by the end

of February 2015, the price had dropped to $54 per barrel, caused by fully operational Southern Keystone Pipeline moving crude oil from Cushing, OK to the Gulf Coast refineries; more production from oil shale plays; production increases from old fields using enhanced techniques; and the slow recovery pace of the economy. The most used relationship between crude oil price and natural gas price is the so-called "6-to-1" rule, where the price of one barrel of crude oil should be approximately six times the price of natural gas per million BTUs (MMBTUs). The reason is that the BTU content of a barrel of oil is around six times the quantity of a million BTUs of natural gas. Natural gas prices recently started to diverge from this relationship, with the current ratio being 17:1. Oil prices rose rapidly, while gas prices fell because Asian countries are consuming more oil than gas as they recover from recessions and the political unrest in African and Islamic countries are disrupting oil supply more heavily than gas supply. Gas has less mobility than oil in international trade because it requires special vessels and infrastructure (pipelines, compression stations, LNG terminals, etc.). Gas prices are cyclical, regional, controlled by supply and demand, and lack infrastructure for international trade. They are driven by factors such as weather, demand for gas not satisfied by pipeline systems, availability of spot supplies, and competing fuel prices. Others factors that could affect prices are storage levels, curtailments, market changes, new consumption, and NAFTA (North American Free Trade Agreement). Gas prices are also affected by psychological factors. Often the expectation of soft prices is enough to bring them about, and a good dose of long, cold, winter weather will usually erase much of the psychological element of low gas prices and price increases.

The lack of mobility of natural gas between producing areas and consuming areas caused by insufficient infrastructure is best shown by the Federal Energy Regulatory Commission's August 2014 world LNG estimated landed prices. Gas prices are $11.35 per MMBTU in Japan and Korea, $10.95 per MMBTU in China, $11.20 per MMBTU in India, $6.76 per MMBTU in Belgium, $9.70 per MMBTU in Spain, $12.34 per MMBTU in Brazil, and in the U.S., it is $4.00 per MMBTU in Lake Charles and $3.27 per MMBTU in Cove Point. The low price in the U.S. is caused by the over supply of gas from shale plays.

Figure 4. Louisiana Natural Gas Historical and Projected Prices



Louisiana annual average gas price is expected to be above $3 per MMBTU in the near future, and to increase to above $4 per MMBTU when demand increases from newly built plants in the state and LNG export terminals became operational.