From: McInall, Steven G. - Dir, Electric Production Resource Planning <mcinsg@jea.com>
Sent: Wednesday, March 28, 2018 12:15 PM
To: Orfano, Joseph E. - Treasurer; Wannemacher, Ryan F. - Dir Financial Planning & Analysis; Moran, Mary L. - Mgr Electric Generation Planning
Subject: Vogtle Memorandum
Attachments: Vogtle Memorandum.docx

Can you take a quick look at this. For Mike/Paul

Thanks

JEA and Plant Vogtle Units 3 and 4

This memorandum briefly discusses the factors involved in the decision in 2008 to enter into the Purchased Power Agreement (PPA) with the Municipal Electric Authority of Georgia (MEAG) for 206 MW of power and capacity from Plant Vogtle.

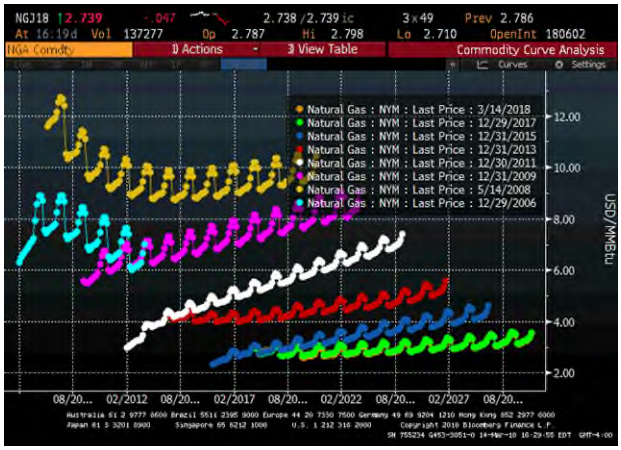
Conditions in 2008

Growth Rate and Expected Need. In 2008, JEA's Average Annual Growth Rate (AAGR) , for both peak and net energy, was approximately 2%. As a result, the projected peak in 2016 was 3,700 MW (winter) and 3,500 MW (summer), with net energy of approximately 17.5 million MWh. Additional energy and capacity was needed to accommodate this expected growth (Source: JEA 2008 Ten Year Site Plan)

Carbon Dioxide Legislation. The first Regional Greenhouse Gas Initiatives started in 2005. By 2008, discussions about global warming and greenhouse gases were accelerating, and in 2009 the Waxman-Markey bill (officially the American Clean Energy and Security Act of 2009) passed the House or Representatives. This bill, which was formulated and debated all through 2008 called for a cap and trade system for carbon dioxide emissions, and implemented renewable standards. It never passed the Senate, and its failure led to the EPA's Clean Power Plan administrative (rather than legislative) approach to carbon regulation.

Natural Gas Prices. Natural gas prices were high in 2008. As seen in the gold colored curve in Figure 1, natural gas prices at Henry Hub were over $10/MMBTU and were expected to stay above $8/MMBTU for the foreseeable future. (Source: Bloomberg)

Figure 1. Natural Gas (Henry Hub) Forward Curves, Selected Years 2006 – 2018. Source: Bloomberg



Nuclear Industry. In 2008, the nuclear industry was in "renaissance" mode. Several new designs had been developed and were being reviewed by the NRC, under a new permitting model (10CFR50.52). Under this model, the reactor design was submitted for approval by the vendor, and plant owners would submit Construction and Operating License Applications (COLA) to build and operate one of these approved designs on their site. The COLA would address site specific issues, while the vendor's Design Control Document (DCD) would address reactor design. Receiving a Construction and Operating License (COL) prior to construction was intended to remove the uncertainty around a separate Operating License application process sat the completion of construction. The Westinghouse DCD for the AP1000 was submitted in 2002. The Vogtle contract was based on Rev. 15 of the DCD in 2008. The Vogtle COLA was submitted in March, 2008. The AP1000 was the most popular design of the nuclear renaissance, as it was selected as the technology for seven different sites (14 reactors). (Source: nrc.gov)

Partners and Contractors. JEA has a long established history of partnership with Georgia utilities. Since the construction of the 500-kV transmission line linking Georgia and Florida, JEA has received anywhere from 10 to 60 percent of its energy requirements from Georgia, with a thirty-five year (1982-2017) average of 22 percent of annual energy requirements. The lead owner on Vogtle, Georgia Power, is a subsidiary of Southern Company, one of the nation's largest utilities. Southern Nuclear is an experienced operator, with six current nuclear plants in their fleet. In addition, Westinghouse, the vendor for the AP1000, was an over 100-yr old company with deep roots in the nuclear industry, and was responsible for the design of over half of the current US nuclear plants. Stone & Webster, the other ½ of the design and construction consortium, was also over 100 years old and had built a large percentage of the current plants.

JEA and Plant Vogtle Units 3 and 4

The Decision

Based on all the factors detailed above, the JEA Board voted in 2008 to set a goal of 10% of JEA's energy to be supplied by nuclear power by 2018. The Vogtle PPA, approved later in 2008, met this goal. The commitment to Vogtle was for a 20-yr PPA for approximately 10% of the output of the plant.

Current Conditions/ Changes Since 2008

Growth Rate and Expected Need. In 2017, following the economic downturn of 2010-2012, JEA's AAGR, for both peak (winter) and net energy, was approximately 0.8%. As a result, the actual peak in 2016 was 2,700 MW (winter) and 2,800 MW (summer), a 20-28 percent drop from the 2008 forecasted peaks. Actual net energy in 2016 was approximately 12.1 million MWh, 30 percent short of the 2008 projection of 17.5 million MWh. (Source: JEA 2017 Ten Year Site Plan)

Carbon Dioxide Legislation. Carbon legislation, while still discussed in some states, has been largely rejected at the national level. Low natural gas prices, however, have driven shifts from solid fuel to natural gas combined cycle power plants that have largely met or exceeded many of the goals of carbon dioxide legislation. As a result, there are currently no projected carbon penalties in the US.

Natural Gas Prices. Since 2008, natural gas prices have fallen dramatically, as a result of the implementation of shale gas recovery technologies. The green and orange curves on Figure 1 show the 2017 and 2018 natural gas price forward curves. Natural gas is now below $3/MMBTU, and expected to stay there for the foreseeable future. (Source: Bloomberg)

Nuclear Industry. The "renaissance" that began in the early 2000s has faltered. Where once there were 28 reactors in licensing or under construction, there are now only the 2 Vogtle units under construction., and FPL's 2 Turkey Point units with applications under review. Other COLs have been granted and put on hold, suspended, withdrawn, or canceled. (Source: nrc.gov)

Partners and Contractors. The Westinghouse AP1000 DCD (Rev. 19) was approved by the NRC in December, 2011, over nine years after the first submittal, and the Vogtle COL was approved in February, 2012. TVA's Bellefonte plant, which was supposed to be the first AP1000 units, was canceled, leaving Vogtle as the first, or "reference" plant for the AP1000. The innovative approaches to construction, i.e., the modular construction intended to speed the construction progress, resulted in QA issues as remote work sites were unable to meet the rigorous nuclear QA required. In addition, the new licensing approach meant that many field changes during construction needed to be processed in advance as license amendments. Through these challenges, delays and cost impacts, the Vogtle owners were protected by their contract with Stone & Webster and Westinghouse, which placed the responsibility for most of the overruns on the vendor. Over the past five years, Stone & Webster, which was owned by Shaw, was sold first to CB&I and then to Westinghouse. Westinghouse, now as the sole prime contractor on the project, announced its financial difficulties in December, 2016, and files for bankruptcy protection in March, 2017. The problems at Westinghouse threatened to drag down Toshiba, its parent company and one of the leading companies in Japan. Toshiba has since paid $3.68 billion to the Vogtle project to satisfy the parent guarantee on the contract, and has sold Westinghouse to an investment company.

Summary

Work continues on Vogtle, but without the benefit of the contract which made Westinghouse responsible for most cost overruns. As a result, any further cost overruns will be borne by the co-owners, and a fraction by JEA. As a result of the demise of carbon rules and the drop in natural gas prices, energy from Vogtle is no longer expected to be economic. Changes in carbon legislation, restrictions on shale gas production, or other factors could quickly change that assessment. The impact to JEA, and to our customers, has been moderated by the relatively small slice of the project for which we are responsible, and by rate restructurings that allowed for early debt repayments, creating room for the Vogtle obligation.