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It's More Than Natural Gas Prices Affecting Nuclear Plant Operations



“While natural gas prices have dramatically affected US nuclear electric plants, a recent study reveals that there are two other factors that must be considered; capital expenses and transmission congestion costs. Several nuclear electric facilities have recently announced closure or plans for an early retirement due to substantial financial challenges beyond natural-gas prices, attributed to large capital expenditures and transmission congestion. These two factors have tipped the scales in favor of retirements and plant closures. However, many states, under pressure to meet their zero-emission goals, realize they can’t do it without these nuclear plants.”

While natural gas prices have dramatically affected US nuclear electric plants, a recent study reveals that there are two other factors that must be considered; *capital expenses* and *transmission congestion costs*.

A recent study, conducted by a D.C. based – think tank, revealed that 29 *merchant* nuclear electric plants are “at risk” of closure. This study examined operations and maintenance, or O&M costs and day-ahead pricing for all 29 “at risk” plants and 5 nuclear electric plants that have recently closed or have announced retirement.

Natural gas plants operating in these same merchant locations have created a “ceiling level” on prices, and the nuclear facilities in these areas that are closing have considerable transmission constraints that have required significant and unexpected capital investment to remedy.

Four of the five nuclear facilities located in the Midcontinent Independent System market already have O&M costs above day-ahead pricing and are “at risk”; ***Duane Arnold*** in Iowa, ***Point Beach*** in Wisconsin, and ***Fermi*** and ***Palisades*** in Michigan.

In Texas, ERCOT’s (Electric Reliability Council of Texas) market area, ***Comanche Peak*** and the ***South Texas Project*** are “at risk” due to a narrow margin level between

O&M costs and the hub price. The use of “scarcity pricing” during supply shortages has provided enough revenue to keep them in operation, but this requires enough revenue over just a few days, each year, to recover their margin.

In the New York ISO market area, Ginna has operated at a loss for every megawatt-hour generated, but due to a recent ruling by the NY PSC, ***Ginna***, ***FitzPatrick***, and ***Nine Mile Point*** will be able to continue operations based on New York’s ***Zero Emissions Credit*** (ZEC).

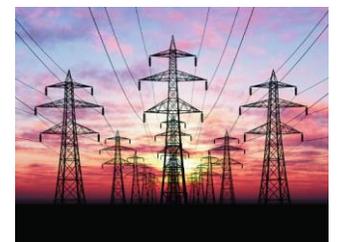
Nuclear electric facilities that have recently announced closure or early retirement have “substantial financial challenges beyond natural-gas prices, primarily attributed to large capital expenditures and transmission congestion. These two factors have tipped the scales in favor of retirements,” the study concluded.

With better geography or lower costs, these facilities could still be operational. For example; the analysis showed that ***Clinton*** and ***Quad Cities***, both located in Illinois, have lower-than-average O&M costs and could weather lower electricity prices spurred by cheap natural gas if it was not for their “unfortunate geography” and transmission congestion

devaluing their electricity. Clinton was scheduled for shutdown by June 1, 2017, and Quad Cities by June 1, 2018, even though they are licensed until 2026 and 2032, respectively.

However, the Illinois legislature passed the Future Energy Jobs Act, a multi-million dollar bill that provides taxpayer subsidies to keep the nuclear plants operating for at least another 10 years. With the passing of this bill and the added capacity charges already set by the PJM a typical Chicago households annual electric bill will increase ~\$140.

Likewise, Entergy’s ***Vermont Yankee*** plant shutdown in 2014, and Pilgrim, in Massachusetts, scheduled for closure in 2019, had O&M costs well below market prices to use as a “cushion to recover capital costs on a continuous basis.” However, negative public sentiments and mounting capital investments brought on by unexpected infrastructure problems and tightening by NRC regulations drove these plants into early retirement.



DOE Issues NOPR that Values Resilient and Reliable Power Plants



NOPR has stirred up a hornet’s nest; 11 energy trade groups made up of renewable energy, oil gas, consumers, rural electric co-ops, and natural gas energy have filed a legal motion FERC to consider input before it decides whether or not to move forward with the DOE’s directive.

If enacted, the NOPR will affect electricity prices paid by hundreds of millions of consumers and hundreds of thousands of businesses, as well as entire industries and their tens of thousands of workers.

The DOE says the NOPR “will strengthen American energy security by ensuring an adequate reserve resource supply”.



Those affected by the NOPR should participate actively and quickly, as the comment record will be critical to the FERC’s decision, as will speed, given the 60-day timeline.

However, DOE says that if FERC cannot get it finalized within the 60 days, then it should issue an Interim Final Rule adopting the DOE’s proposal, effective immediately, with provision for later public comment and modification.

“The proposed rule, issued by the Department of Energy (DOE), will require full recovery of the costs of fuel by secure generation units frequently relied upon to make our grid reliable and resilient. What that means in everyday language is that power plants that have a 90-day fuel supply on-site — coal, nuclear and hydro — would be guaranteed “full recovery of their costs” and a “fair rate of return”.

Recently, the U.S. Department of Energy (DOE) issued a NOPR (Notice of Proposed Rule Making) with the Federal Energy Regulatory Commission (FERC) that will revolutionize the wholesale electricity market and place increased value on electrical sources that provide reliability and resiliency; **coal, hydro, and nuclear power plants.**

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For the consumer the question becomes what is

considered a “fair rate of return” and who make this decision?”

This would be determined by FERC and they would have to work with regional transmission organizations and independent grid operators to establish a rate that would ensure “recovery of costs” and “fair rate of return”.

Some say this recognition and market compensation is long-overdue for our baseload plants; based on decades of resilient and reliable service.

Other will say the rule is antithetical to the concept of competitive wholesale power markets and fuel diversity, and it is just a bailout for struggling nuclear and coal plants.

The DOE is telling FERC to get this NOPR done in final form within 60 days (end of November), but as you might expect, the

Vistra Energy's Board of Directors Approve Dynegy Inc. Merger



“Vistra Energy announced their plan to merge with Dynegy Inc. in a tax-free, all-stock transaction, creating the leading integrated power company across the key competitive power markets in the United States; ERCOT, PJM, and ISO-NE. Together they will serve approximately 240,000 commercial and industrial (C&I) customers and 2.7 million residential customers in five top retail states, with retail sales estimated at 75 terawatt (TWh) hours in 2018.”

Vistra Energy, the parent company for TXU Energy and Luminant, announced their plan to merge with Dynegy Inc. A definitive merger agreement has been approved by the Vistra Board of Directors with Dynegy in a tax-free, all-stock transaction, creating the leading integrated power company across the key competitive power markets in the United States.

The resulting company is projected to have a combined market capitalization in excess of \$10 billion and a combined enterprise value greater than \$20 billion.

The combination of Dynegy's generation capacity and the retail footprint of Vistra Energy's integrated ERCOT model this merger is expected to create the lowest-cost integrated power company in the electrical utility industry and position Vistra-Dynegy as the leading integrated retail and generation platform, throughout key competitive power markets, in the U.S.

Together they will serve approximately 240,000 commercial and industrial (C&I) customers and 2.7 million residential customers in five top retail states, with retail sales estimated at 75 terawatt (TWh) hours in 2018.

In addition, the combined company will also own approximately 40 GW of installed generation capacity, of which, greater than 60% is natural gas-fueled, and 84% of it is located within the ERCOT, PJM, and ISO-NE competitive power markets.

The Vistra Energy - Dynegy merger will also result in ~40 gigawatts (GW) of high-quality, low-cost, environmentally compliant power generational assets. They too are concentrated within ERCOT, PJM, and ISO-NE; the most desirable competitive markets in the U.S.

Vistra Energy President and Chief Executive Officer Curt Morgan said, “This combination

represents a transformative opportunity to create the leading integrated power company in the United States. Combining Vistra Energy's leading retail and commercial operations with Dynegy's leading CCGT fleet and geographically diverse portfolio, together they are expected to create a company with significant earnings diversification and scale. The resulting combined enterprise is projected to have the lowest-cost structure in the industry and will benefit from weather and market diversification that, when combined with Vistra Energy's balance sheet strength, will provide a platform for future growth. The result will be a leading integrated power company with significant scale in the key U.S. competitive markets. We look forward to building on Vistra Energy and Dynegy's highly attractive business mix and asset quality to deliver enhanced value to current shareholders of both companies and attract and retain new investors on a long-term, sustainable basis.”



Clean Water Rule Still on HOLD – Scalia’s or Kennedy’s Definition?



“The Federal Pollution Control of 1948 was the first major U.S. law to address pollution. Growing public awareness and concern for controlling water pollution led to sweeping amendments in 1972. As amended in 1972, the law became commonly known as the Clean Water Act (CWA).

The EPA and Army Corps of Engineers issued the Clean Water Rule, aimed at clarifying which bodies of water fall under the Clean Water Act; such as, ponds, headwater and wetlands. However, 31 states and business groups believe the authority for enforcement of this Act was given to the states and not to the federal government or its agencies.”

The Clean Water Rule, first proposed in 2014, sought to clarify the legal jurisdiction of the federal government under the Clean Water Act. In doing so, it expanded protection for two million miles of streams and 20 million acres of wetlands.

This expansion was considered “overreach” because it redefined the definition of “navigable waters” and “waters of the United States” in several subtle but important ways. For example, although traditional navigable waterways were always included, the EPA stated in the “preamble to the rule” that these waterways included all waters used for commercial waterborne recreation, such as guided fishing trips or water ski tournaments. Additionally, it defined tributaries as any water that contributes flow, directly or indirectly, to a traditional navigable waterway and that is characterized by the presence of a bed and banks and an ordinary high water mark. Finally, it added a definition of “adjacent” as bordering, contiguous or neighboring.

The rule also increased the jurisdictional reach of the EPA and the Army

Corps of Engineers. Now waterways, and their adjacent wetlands, not previously subject to regulation would be subject to permitting under the Clean Water Act and a landowner or developer could find themselves a recipient of an enforcement action from one of these agencies.

This resulted in suits over the “proposed rule” and the Sixth Circuit stayed the rule almost immediately, as they agreed the rule exceeded the EPA’s and Corps’ authority under the Clean Water Act and the rule, as published in 2014, never went into effect. And in 2015, the Clean Water Rule was put on hold by a federal appeals court. Since then, it has been on hold while the case works its way through the courts.

On February 28, 2017 President Trump signed an executive order, directing the EPA, which issued the original rule in conjunction with the Army Corps of Engineers, to “review and reconsider” the rule, paying special attention to the definition of “navigable waters.”

The EPA and the Army Corps of Engineers were required to consider defining the scope of jurisdiction in a manner similar to the approach announced by Justice Antonin Scalia in the Rapanos case. In that case, Justice Scalia stated jurisdiction extended to waters that are navigable in the traditional sense: relatively permanent,

standing or continuously flowing bodies of water, and wetlands with a continuous surface connection to those relatively permanent waters.

The argument against the use of Scalia’s definition is based on the fact that 1 in 3 Americans receive their drinking water from a source that would not be included under Scalia’s narrower definition of waters.

Opponents of the Scalia definition prefer Justice Kennedy’s definition, which is based on an opinion from a 2006 Supreme Court decision, where he argued that waters could fall under the jurisdiction of the Clean Water Act if they have a “significant nexus” to navigable waters.

The Trump administration has not officially released its interpretation of the rule and it’s unclear when it will be finalized or put forward for public comment. But if the rewrite of the rule follows Scalia’s definition of navigable water, legal experts warn that the rule will face an uphill battle in the courts, since no federal court of appeals has ever upheld the Scalia definition of navigable waters by itself. In five district court decisions since 2006, only one court has ruled Scalia’s test or definition. All other decisions found that the regulations must meet Kennedy’s “significant nexus” test.

Did You Know?



“That pressure is building over concerns that 84,250 tons of spent fuel assemblies are currently being stored at nuclear facilities across the country. DOE Secretary Perry said he supports the idea of interim storage at a nuclear waste facility like Waste Control Specialists, LLC in Texas. Waste Control Specialists LLC has applied for a license with the NRC to establish an interim storage site in Andrews County, north of Odessa.”

<p><i>Fossil fuels will be main energy source for decades</i></p>	<p>That OPEC says growth in global oil demand will steadily lessen from an annual average of 1.3 million barrels a day between 2016 and 2020, to 300,000 barrels a day by 2035-2040. However, <i>fossil fuels will still be the main energy source for decades.</i></p>
<p><i>France backpedals on pledge to cut reliance on nuclear power</i></p>	<p>That <i>France's environment minister is backpedaling on pledge to cut reliance on nuclear power so that the government can concentrate on reducing fossil fuels instead.</i> France depends more on nuclear energy than any other country, getting about three-quarters of its electricity from its 58 nuclear plants.</p>
<p><i>Building Energy begins construction of PV Plant</i></p>	<p>That <i>Building Energy SpA</i>, a multinational company operating as a global integrated IPP in the Renewable Energy Industry, has <i>announced the beginning of their construction of the Annapolis Solar Park</i>, a 18 MW photovoltaic (PV) system stretching over an 80-acre area occupied by a landfill in Annapolis, MD.</p>
<p><i>Wind, Solar Costs Decline, Coal remained constant, and Nuclear Costs increased (cost of Fukushima modifications)</i></p>	<p>That the <i>cost of solar generation fell from \$55 per MWh in 2016 to \$50 per MWh this year.</i> In 2009, the levelized cost of solar production was \$178 per MWh, making it by far the most expensive form of utility-scale electricity generation. Similarly, the price of <i>wind generation fell from \$47 per MWh to \$45 per MWh this year.</i> Those years also show a significant drop from 2009, when the price was \$85 per MWh. However, the price of <i>coal generation remained unchanged from 2016 to 2017 at \$102 per MWh.</i> Though the 2009 price of coal generation was \$111 per MWh, coal prices have since fluctuated and previously hit \$102 per MWh in 2012. <i>Nuclear generation spiked from \$117 per MWh in 2016 to \$148 per MWh this year; the cost of Fukushima modifications.</i></p>
<p><i>Wind facilities median O&H cost was >\$48K per MW in 2016</i></p>	<p>That <i>operations and maintenance on North American wind facilities is expected to exceed \$40 billion from 2015 through 2025.</i> Much of that cost is due to aging equipment, as the majority of wind turbine equipment is more than five years old. Based on market studies the estimated <i>median O&H cost was more than \$48,000 per MW in 2016.</i></p>
<p><i>Oil and gas drilling in Alaska's Arctic National Wildlife Refuge moves closer</i></p>	<p>That <i>oil and gas drilling in Alaska's Arctic National Wildlife Refuge moves closer</i> as a key Senate panel approved a bill to open the remote refuge to energy exploration. Senator Lisa Murkowski, R-Alaska, said <i>drilling can be done safely with new technology</i>, while ensuring a steady energy supply for West Coast refineries. The <i>measure would generate about \$2 billion in royalties over the next decade</i>, Murkowski said, with half the money going to her home state.</p>
<p><i>Nuclear Capacity growing at an annual rate of 1.6%</i></p>	<p>That the EIA (Energy Information Agency) projects global <i>nuclear capacity will grow at an average annual rate of 1.6% through 2040</i>, led predominantly by China and India. This growth will offset declines in capacity being realized in the U.S., Japan, and Europe.</p>

U.S. Nuclear Renaissance Watch Update



Under Construction:

Vogtle 3 & 4 – 1,100 MWe Westinghouse AP1000, Southern Nuclear Operating Company; Waynesboro, GA; COL issued February 10, 2012; ~60% complete in EPC terms.

V.C. Summer 2&3 - Project ABANDONED July 31, 2017. 1,100 MWe Westinghouse AP1000, SCANA / Santee Cooper; Parr, SC; COL issued March 30, 2012; ~64% complete in EPC terms.

Licenses Received:

Fermi 3 – ESBWR, DTE Energy; Monroe, MI; **COL issued May 1, 2015**; licensee has not signed an EPC contract, or announced any commitment to build and operate.

South Texas 3&4 – Toshiba ABWR, Nuclear Innovation North America; Palacios, TX; **COL issued February 12, 2016**; EPC contract signed February 2009. *Design certification application for the Toshiba ABWR was closed by the NRC in January 2017.*

Levy 1&2 – AP1000, Duke Energy; Levy County, FL; **COL issued October 26, 2016**; original EPC contract signed in January 2009 was cancelled on August 1, 2013, and has not been reinstated. *Duke Energy announced on August 29, 2017 they will not be moving forward with this project, pending approval by the Florida PSC.*

Lee 1&2 – AP1000, Duke Energy; Gaffney, SC; **COL issued December 19, 2016**; licensee has not signed an EPC contract. *Duke Energy announced on August 25, 2017 they will not be moving forward with this project, pending approval by the North Carolina Utilities Commission.*

North Anna 3 – ESBWR, Dominion Generation; Mineral, VA; **COL issued May 31, 2017**; Dominion and GE Hitachi Nuclear Energy have stated that they have reached agreement on all contract terms but licensee has not signed an EPC contract.

ABWR – 1,350 MWe GE Hitachi design – BWR (Boiling Water Reactor)

AP 1000 – 1,100 MWe Westinghouse design – PWR (Pressurized Water Reactor)

ESBWR – 1,520 MWe GE Hitachi design – BWR (Boiling Water Reactor)

Duke Energy's **Harris 2&3**, and Luminant's **Comanche Peak 3&4 License Applications have been slowed or suspended at the request of the applicant.**

Talen Energy's **Bell Bend License Application was withdrawn on August 31, 2016.**

“Active” License Applications:

Turkey Point 6&7 – 1,100 MWe Westinghouse AP1000, Florida Power & Light; Florida City, FL; **FSER** November 10, 2016; **FEIS** October 2016; **MH** October 5, 2015; EP2 completed February 27, 2015. A request for hearing and petition to intervene was submitted on April 18, 2017 by the City of Miami, Village of Pinecrest, and City of South Miami.

Eastern Idaho – two or more NuScale Power Modules (SMR), Utah Associated Municipal Power Systems with Energy Northwest; on or near the property of Idaho National Laboratory. **Application submittal planned for 2018.**

Early Site Permits:

PSEG Site – reactor TBD, PSEG; Salem, NJ; **FSER** issued September 29, 2015; **FEIS** issued November 13, 2015; **MH** March 24, 2014. **ESP** issued May 5, 2016.

Clinch River Site – reactor TBD, TVA; Clinch River, TN; **Application** submitted May 12, 2016; **NRC** accepted application for docketing and detailed technical review on December 30, 2016. **Three groups filed petitions** in June 2017 against TVA's application; **ASLB** established in July 2017.

Blue Castle Project – two AP1000, Blue Castle Holdings; Green River, UT. **Application submittal planned for 2019.**

ASLB – atomic safety & licensing board

COL – combined operating license

EPC – engineering, procurement, & construction

ESP – early site permit

FEIS – final environmental impact statement

FSER – final safety evaluation report

MH – mandatory hearing



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**HAS BEEN SERVICING THE
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Duke CEO – “We are not Interested in New Nuclear “



The nation's largest electric utility has doubled down on its position about investing in the abandoned expansion at V.C. Summer Nuclear Station; they are not interested. Duke Energy's CEO, Lynn Good said, we have no interest in the new nuclear plant in South Carolina and we've been clear about that," she responded. "Given the risks and the uncertainties around completion of that plant, we don't think there's a fit either for customers or investors, and we've been very candid with the state about that."

CEO Good said South Carolina is "incredibly important" to Duke Energy, and Duke is South Carolina's largest power provider, with a network that runs from the Pee Dee into the South Carolina Upstate; about 740,000 electric customers. We plan to invest ~\$3 billion over the next decade to harden the power grid in South Carolina. "We're engaged in South Carolina and supporting our businesses in a way you would expect, but we have no interest in pursuing new nuclear," said Good.

After SCANA and Santee Cooper abandoned the V.C. Summer Expansion Project, Duke Energy was one of three major utilities that South Carolina Governor Henry McMaster contacted about an interest in buying a stake in the failed project. However, Duke Energy bowed out of those talks, saying that it had "looked at this from every angle, and we concluded that it is not feasible for us to take on." That same day, Duke requested permission from regulators to abandon their plans to build Lee Nuclear Station in Cherokee County, near Gaffney, SC.

It is still unknown if Duke Energy has any plans to invest in Moncks Corner-based Santee Cooper. South Carolina Governor McMaster is seeking a buyer for all or part of the state-owned utility, which sells electricity to South Carolina's 20 electric cooperatives. Duke Energy, Dominion Energy, Southern Co. and NextEra Energy are all said to be prospective bidders.

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