ATTACHMENT B

RBN Energy LLC, Spire STL Pipeline,
Analysis of Current and Future Market (Nov. 10, 2021) ("2021 Market Study")

Spire STL Pipeline

Analysis of Current and Future Market

Report prepared by:

RBN Energy LLC

November 10, 2021

RBN Energy LLC

Table of Contents

Page No.

EXECUTIVE SUMMARY

RBN Energy LLC ("RBN"), at the request Spire STL Pipeline LLC ("Spire STL"), was asked to review the need for the Spire STL Pipeline ("STL Pipeline," or the "Project"), based on market fundamentals without regard to the contractual relationship with Spire Missouri Inc. ("Spire Missouri") or any other existing or potential contractual relationship. RBN examined the documents already existing in the record in Docket No. CP17-40 and all sub-dockets along with limited interviews with company executives, and resources independently produced and controlled by RBN. Actual experience from the two years during which STL Pipeline has been operating was used to confirm or question any of RBN's observations. As part of this analysis, RBN reviewed a separate analysis conducted by Black & Veatch Management Consulting, LLC, entitled, "Updated: Review of Current Natural Gas Infrastructure Serving the Greater St. Louis Market and Potential Supply Disruptions During Peak-Day Demand," and included as Appendix A hereto. This analysis helped inform RBN as to how a shut-down of the STL Pipeline would affect the eastern Missouri gas market.

RBN examined the Project's value to reliability and cost of natural gas, based on the Project's diversification of Spire Missouri's sources of supply. RBN considered the STL Pipeline's ability to leverage different supply sources to protect against weather-driven upsets in reliability and gas costs, using RBN's market-leading expertise in assessing the natural gas marketplace. RBN also examined the Project's operational benefits to Spire Missouri.

In addition, RBN examined all of the alternatives to continued operation of STL Pipeline that had been identified by Spire Missouri, parties to the case, and the FERC Staff in its data requests to Spire STL. None by themselves or in combination would resolve the operational and gas supply challenges that would be faced in the absence of STL Pipeline or accomplish the economic and reliability benefit of the commercial and geographic diversification afforded by STL Pipeline.

Accordingly, RBN's analysis confirms that the STL Pipeline is the overwhelmingly best choice to meet the needs of the St. Louis metropolitan area, based on fundamental dynamics of reliability, safety, economics, and security of gas supply. RBN observes that during the two years the STL Pipeline has been in service, it has conclusively proven its contribution to providing reliable service and reduced gas costs that protect and benefit St. Louis area gas consumers.

I. INTRODUCTION AND BACKGROUND

Spire STL Pipeline LLC ("Spire STL") is applying for a reissuance of a certificate of public convenience and necessity for its Spire STL Pipeline ("STL Pipeline," or the "Project"). After vacatur of the original certificate by the U.S. Court of Appeals for the District of Columbia Circuit ("D.C. Circuit"), Spire STL received a temporary emergency certificate, under which it is authorized to operate only through December 13, 2021. RBN Energy LLC ("RBN") has been asked to assess the need for, and operational benefits of, the Project in terms of reliability and supply optionality, by examining the economic value conferred upon Missouri consumers by the Project's connection to the Rockies Express Pipeline ("REX"), the operational value of the Project to Spire Missouri Inc. ("Spire Missouri"), and alternatives to the continued operation of the Project in terms of their operational value and their cost.

First, RBN assesses the value of supply diversity offered by the Project, in terms of access to the supply basins connected to REX and thus available to STL Pipeline customers. The supply diversity is evaluated both on the existing and ongoing relative economics of those supply basins and on the value of connectivity with them to reliability of supply during crises such as Winter Storm Uri.

In performing this analysis, RBN relies heavily on its own extensive market expertise and on the large quantity of information that has been produced in FERC Docket No. CP17-40 (including sub-dockets) such as discovery responses, pleadings by parties other than Spire STL (including Spire Missouri), and, where appropriate, on a review of press reports. In particular, in assessing the value of the supply diversity offered by the Project, RBN relies on its own market-leading expertise in the Marcellus and Utica shale basins in the northeast and in the Rocky Mountains and Denver Julesburg ("DJ") Basin.[1] RBN also relies on its own analysis of the impact of substantial exports of liquefied natural gas ("LNG") from the U.S. Gulf Coast ,the dynamics of Louisiana, Texas, and Oklahoma supply that feeds the pipeline alternatives to the STL Pipeline, and its ongoing analysis of the events of February 2021 with the impact of Winter Storm Uri on prices and utilities generally in the Midcontinent.[2]

Next, the RBN examination first identifies the market dynamics in the St. Louis area, in terms of whether and where shifts in demand for natural gas service have occurred, and the resulting need for the addition of new pipeline capacity into the market. It then explains the degree to which the Project addresses both load shifting and operational vulnerability, including the role the Project plays in managing Spire Missouri's substantial and important storage operation in the Lange storage field.

[1] Formed in 2011, by a former owner of Bentek Energy (now Platts Analytics), RBN has become a major source of facts and analysis for much of the industry in the status, development, and economics of the subject gas supplies. It has performed many direct consulting engagements involving supply areas throughout the nation and the resulting infrastructure requirements and publishes a great deal of expert material relied upon throughout the natural gas industry, including its widely read "Daily Energy Post," which has 33,000 subscribers and has been described by CNBC's Jim Cramer as "the best oil and gas newsletter on the planet." RBN has advised the Department of Energy, the Center for Strategic and International Studies as well as multiple other organizations as to oil and gas economics and fundamentals throughout the nation and is a frequent source of energy intelligence and interpretation by industry trade press as well as the Wall Street Journal.

[2] The "Midcontinent" refers to an expanded version of the Midwest, essentially extending east-to-west from Ohio to the Rocky Mountains and north-to-south from Texas to the Canadian border.

Last, the RBN report examines the identified alternative pipeline options among the other natural gas pipelines that serve the area, and assesses their capability to provide the same operational benefits as does the STL Pipeline, specifically:

- Enable's Mississippi River Transmission LLC ("MRT");
- MoGas Pipeline LLC ("MoGas"); and
- Southern Star Central Pipeline Inc. ("Southern Star").

The report also examines the adaptations in addition to, or in lieu of additional pipeline service, that would be required to attempt to replace the STL Pipeline in the event it were to be removed from service. These include:

- Restoration of compression for injection at the Lange storage facility;
- Restoration of propane injection capability; and
- Expansion of the east-to-west capabilities of the Spire Missouri system.

Together, these pipeline and non-pipeline options are referred to as the "identified alternatives." RBN estimates the costs of all of the identified alternatives and compares those costs with service from STL Pipeline.

II. SUMMARY OF FINDINGS

- The STL Pipeline affords significant reliability and economic value to consumers.
  - It provides access to some of the lowest-priced and most prolific natural gas production in the nation, and
  - It greatly diversifies the geographic footprint of Spire Missouri's supply sourcing to avoid crises such as those caused by the recent Winter Storm Uri. The STL Pipeline provides essential operational value to the Spire Missouri system.

- The Project provides critical natural gas supply to areas to which load is shifting, to avoid cold-weather curtailment,
  - It reinforces deliveries to the growing western side of the system through MoGas instead of requiring excessive new construction of facilities by Spire Missouri in heavily populated parts of the metropolitan area, and
  - It allows storage injections and peak-day coverage without running compression and injecting high Btu propane into the distribution system.

- RBN's independent review concludes that no current alternative or combination of alternatives can achieve the level of reliability, cost savings or supply-diversity offered by STL Pipeline.

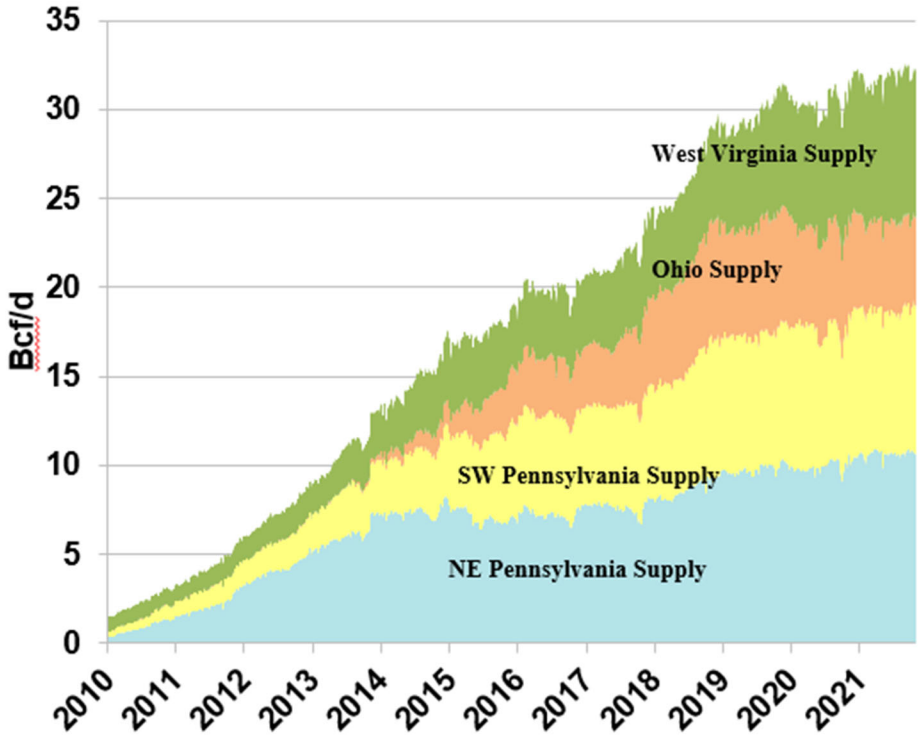
Finally, it is RBN's finding that continued operation of the STL Pipeline is essential to support reliable and affordable service to the consumers of the St. Louis metropolitan area and is thus fully supported by the fundamentals of operation, supply, and cost without regard to any contractual relationships. The accuracy of these findings has been overwhelmingly proven by the experience of the two years that STL Pipeline has been in service, a period that, because of the Winter Storm Uri crisis, offered a "bench test" of the

value of STL Pipeline—a test it passed with flying colors.

III. VALUE OF SUPPLY DIVERSITY OFFERED BY THE STL PIPELINE

The U.S. natural gas industry has been fundamentally transformed over the last decade, based on the evolution of shale-gas supply beginning in the early 2000s. As of 2011, traditional flow of supply from the Gulf Coast and Texas to the northeast U.S. virtually ceased as burgeoning production from the Marcellus shale play in Pennsylvania and West Virginia brought forward enough gas supply to make northeast demand centers self-sufficient. By 2014-15, Marcellus production had continued to grow beyond all projections, and had been joined by the Utica shale play in Ohio, leading to production sufficient to supply not only the northeast, but markets in other parts of the country. Existing long-line pipelines from the traditional southern producing areas to the traditional consuming markets in the northeast first came to a physical stop, then began to reverse flow, moving gas south. At the same time, beginning with the first approval in 2010, the export of LNG to other nations overseas became a reality, with the first exports occurring in 2016 and growing steadily as other capacity came online. In response, the now-southbound pipelines from the northeast now began to expand, rapidly. These developments have now culminated in a complete reversal of roles between the northeast U.S. and the Gulf Coast. Now, Henry Hub, which since 1990 has been the core reference point for supply and pricing in the nation, is the most prolific demand center, and broad areas of the northeast in Pennsylvania and Ohio have become centers of low-cost supply for the rest of the nation. Figure 1 tracks the growth in northeast production by area since 2010.

FIGURE 1—Northeast Production, 2010-2021

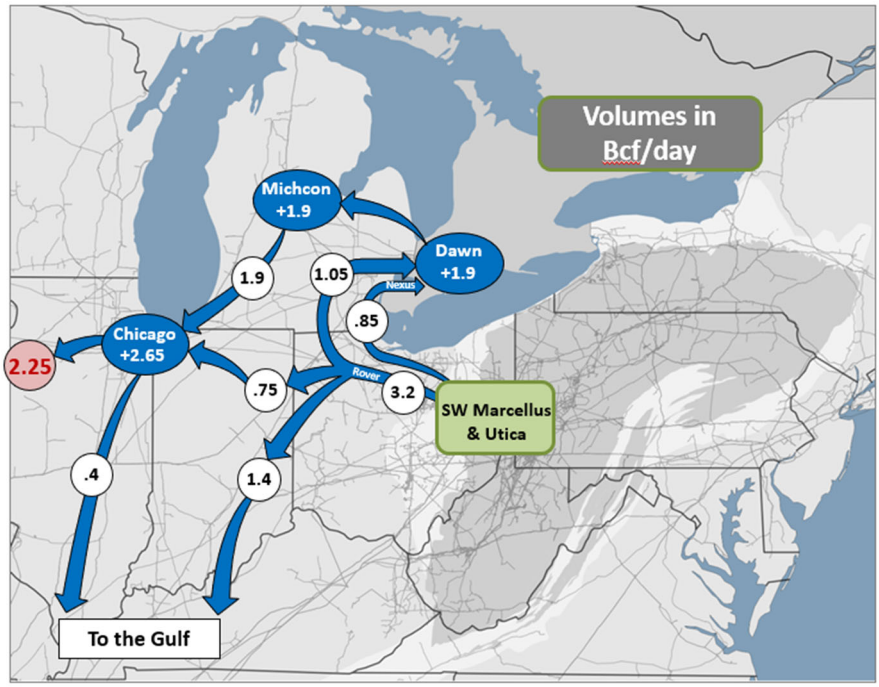


As this transformation was underway, the REX pipeline went into service, in 2009, to move trapped Rockies gas to the east, all the way to Ohio. Confronted with now-abundant supply at its terminus, REX obtained the necessary approvals to reverse the eastern end of its system, to move gas from both the Rockies and the northeastern producing areas in Marcellus and Utica. These two flows of low-cost gas converged in the Midwest, south of Chicago, then moving north and south on other pipelines to serve Midcontinent markets. For the northeast supplies, limitations on the ability to move all of the production to high-value markets on the Gulf Coast forced substantial quantities of gas to move west, with REX being the best and most efficient route for doing so. Figure 2 depicts the role of REX in providing a "header" across the nation between these two major supply areas. Major pricing points that define the gas available to REX in the east are Eastern Gas Transmission South ("EGTS," the former Dominion South), and Columbia Gas Transmission Corporation ("TCo"). Rockies and DJ Basin gas aggregates and moves west on REX at the Cheyenne, Wyoming Hub ("Cheyenne Hub").

FIGURE 2—REX Connects East to West to Serve the Midcontinent

Since the inception of west-to-east transportation on REX, an additional route has opened on Rover Pipeline, which feeds over 3 Bcf/day from Ohio into the Dawn Hub in Ontario. However, Dawn is already fully supplied, causing the incremental supply to push west into Michigan, where markets are also already fully supplied, and thus largely into Chicago. Then Rover was followed by a virtually identical pipeline, NEXUS, which added 0.85 Bcf/day to the Dawn surplus. That movement of gas displaced gas south out of Chicago, thus putting downward price pressure on REX and creating excellent buying opportunities of somewhat distressed gas in the Illinois portion of REX. Figure 3 below depicts the impact of Rover when it went into service. REX and other preexisting pipelines are not shown since Figure 3 is focused on the incremental impact of the additional capacity.

FIGURE 3—Impact of Rover and NEXUS Pipelines on Midwest Supply Surplus Since 2017



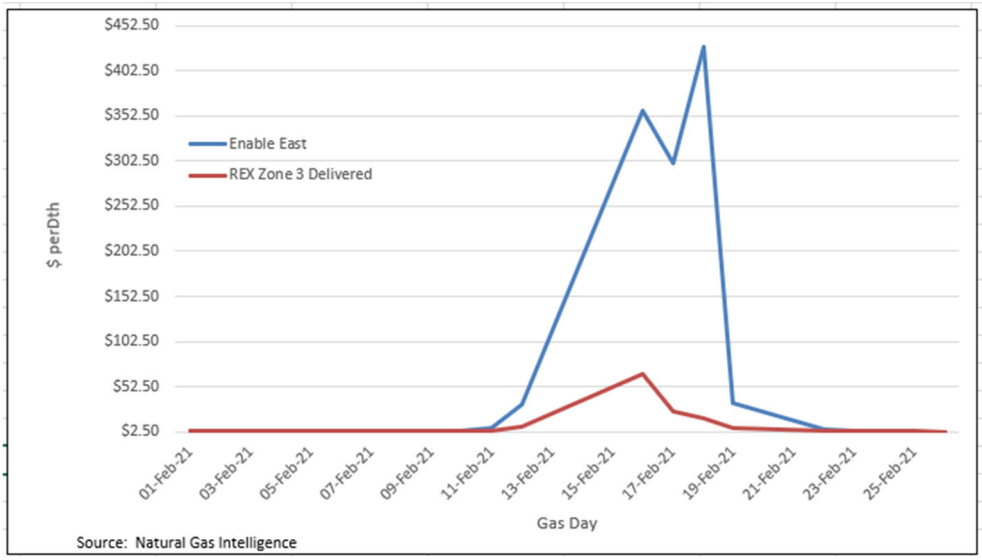
The resulting oversupplied market accessible through REX thus created and represents an excellent opportunity for any gas consuming market that can economically attach to REX. STL Pipeline did so and offers connections to some of the lowest-cost and most prolific supply in the nation including Marcellus and Utica plays, as well as the Rocky Mountains and DJ Basin. RBN has analyzed the Marcellus and Utica plays on an ongoing basis, for our county-by-county production and economics forecasts. Based upon those current and future evaluations, the value of holding direct access to northeast supply is substantial. Additionally, the revolutionary impact of REX has been crucial, first on the role Rockies gas could play in the national picture and the price-reducing impact REX had on the entire industry when it went into service over a decade ago, followed by its impact on the ability of low-cost northeast gas to escape the severe eastbound and southbound pipeline constraints out of the northeast production region and move west to flood the Midcontinent with low-cost supply. In REX's role as a "header," or bidirectional pipeline accessing widely separated supply areas, it allows Rockies gas to compete directly with Marcellus and Utica gas for Midwestern loads, particularly where the two streams collide in Illinois. STL Pipeline connects in the exact portion of REX where that collision takes place, and thus can enjoy both the capacity benefits and the competitive benefits of a pipeline fed from both ends.

In addition, the very wide geographic separation of northeast supply, Rockies supply, Texas, Louisiana and Oklahoma supply, all of which Spire Missouri can draw on with STL Pipeline in service in addition to MRT, provides substantial protection against regional weather events, even something as large as Winter Storm Uri or a Gulf Coast hurricane. The natural gas industry has become largely "hurricane proof" as a result of so much production now being from onshore shale, rather than the offshore Gulf Coast. However, hurricanes still do have a significant impact, not only on the 2 or 3 Bcf/day flow from offshore, but also on the Gulf Coast pipelines, processing facilities, etc., that feed a pipeline such as MRT. The supply

diversity provided by STL Pipeline insulates the St. Louis area from any storm-driven adverse impacts. Similarly, retaining substantial capacity on MRT, as Spire Missouri has done, protects against any upset that might limit flows from either Marcellus/Utica or the Rockies.

The degree to which Spire STL protected against impacts on consumers during Winter Storm Uri may be seen by comparing Enable East (Oklahoma) prices with REX Zone 3 prices (the access point for STL Pipeline). Figure 4 does so, plotting the index prices throughout February 2021:

FIGURE 4—Cost and Rate Impact of Sourcing Alternatives to STL Pipeline

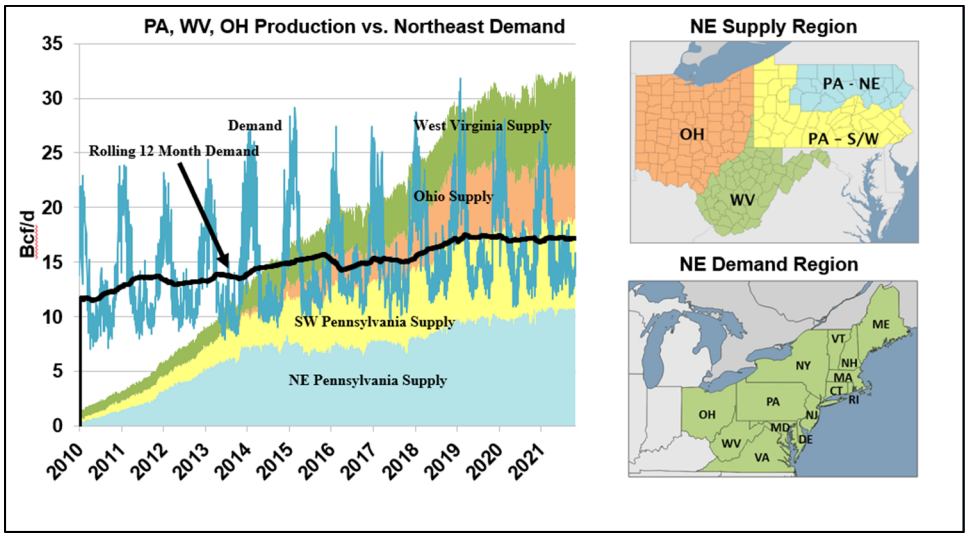


As may be seen, the price spike in Enable East was over $360.00 per Dth higher than that experienced in REX Zone 3. Henry Hub, the surrogate price for Gulf Coast supply, remained relatively stable, rising by approximately $20 per Dth. Thus, being able to mix REX Zone 3 volumes with Gulf Coast volumes and avoid relying on Oklahoma, Spire Missouri's customers saved, as noted in various pleadings, as much as $300 million. This experience is very much at odds with that of utilities from Texas to Minnesota, which experienced massive increases in their gas costs—one major utility in Oklahoma spent three times its entire annual gas budget in one week[3]. Very simply, STL Pipeline protected St. Louis consumers from this fate.

Meanwhile, the relationship between northeast supply pricing and pricing in Louisiana has turned completely upside-down from its historic configuration, with Louisiana becoming a net consumption market and the northeast becoming a net supply market. Figure 5 shows the evolution of northeast supply as described above, first its adequacy to serve all northeast demand, and now its ability to do so with substantial supply to spare.

[3] Oklahoma Gas and Electric Company, February 2021 Winter Weather Event, Securitization of Extraordinary Costs, Oklahoma Corporation Commission Cause No. PUD 2021-0072.

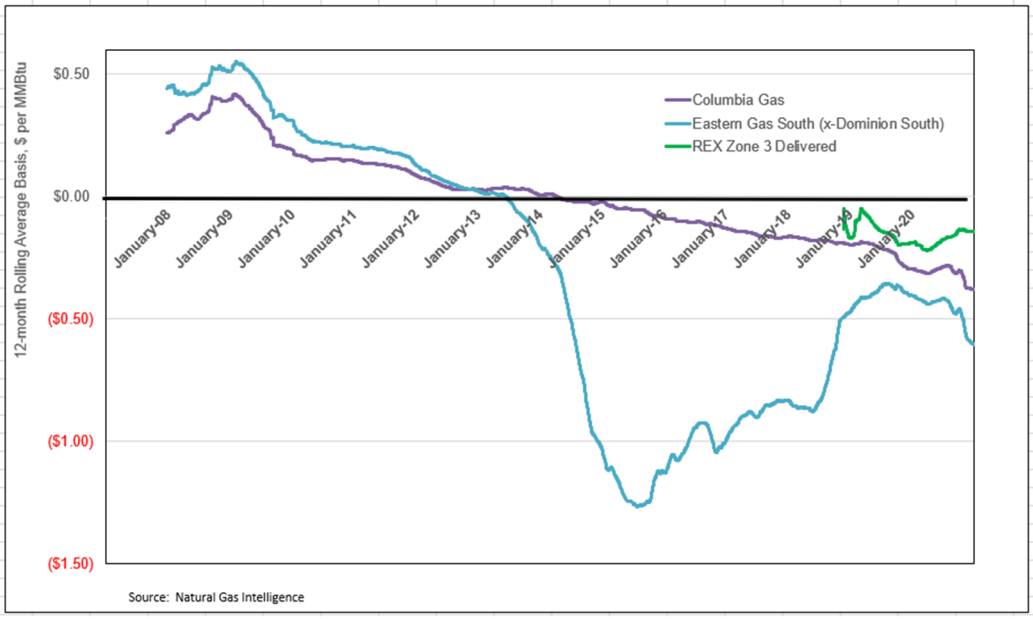
FIGURE 5—Evolution of Northeast Supply and Demand, 2010-2021



As is clear from the rolling-12-month northeast demand as compared with the total supply from the four northeast supply regions, as much as 15 Bcf/day is available for transport to other regions. Much goes south, to support consuming markets in the Gulf Coast including LNG. For example, the first major LNG export terminal, Cheniere Inc.'s Sabine Pass Liquefaction plant, is the largest single natural gas customer in the nation. However, pipeline capacity to reach the Gulf Coast is limited and difficult to expand. As a result, LNG exports pull hard on Texas, Oklahoma, and Louisiana supplies, while a large portion of the northeast gas, above northeast requirements, seeks markets to the west, with REX being a major outlet.

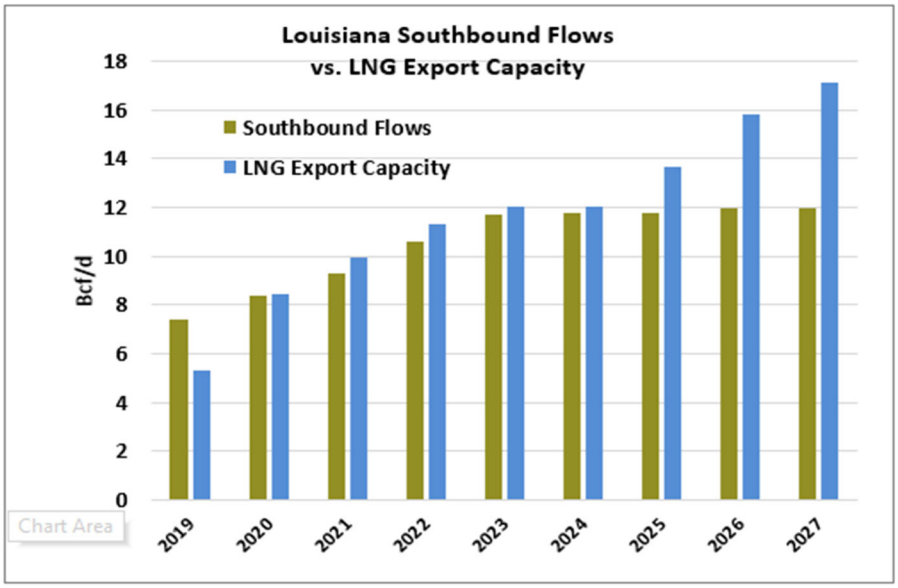
As for the impact of Louisiana's transformation to a demand market and the northeast's transformation to a net supplier to multiple regions, as noted, the aforementioned reversal of pricing relationships has been profound. Figure 6 shows the change in basis vs. Henry Hub in the northeastern states, focusing on two major pricing points, TCo and EGTS. As the chart shows, pricing in the region went from a significant positive basis to negative in the 2014-15 period when gas began moving steadily out to the south. Data for pricing in REX Zone 3 is relatively recent (the green curve), but it follows the same pattern, chronically below Henry Hub.

FIGURE 6—12-Month Rolling Average Northeast Basis, 2008-2020



In addition to natural gas from the northeast, the rapidly growing Gulf Coast demand markets are pulling supply from northern Louisiana (Haynesville), Texas (Permian and Eagle Ford), and Oklahoma (the Anadarko). As a result, there is significant upward pressure on Gulf Coast prices, coupled with the simple fact that Henry Hub has become a demand center, rather than its traditional role as a supply center. Accordingly, Henry Hub and Louisiana in general tend to see higher supply prices (as a destination market) than do primary supply areas such as the Marcellus/Utica basins. And this pressure will not stop in the foreseeable future. Figure 7 is RBN's projection of the capacity growth in LNG export capacity, and the flow of gas southbound through Louisiana.

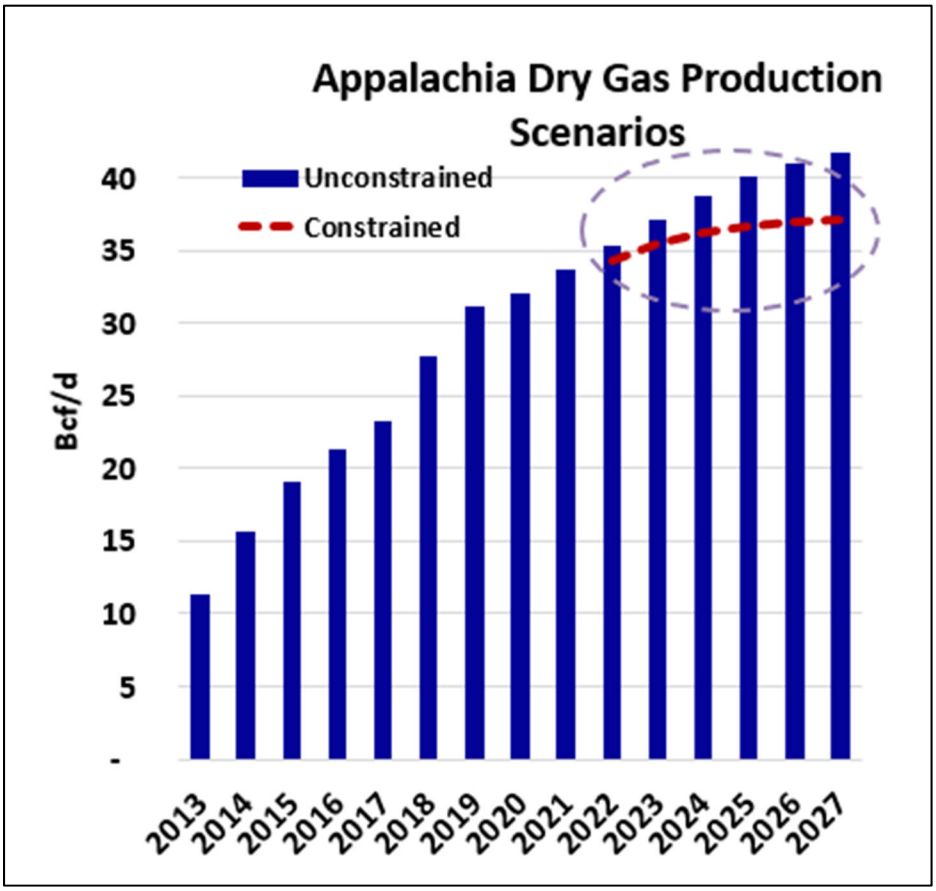
FIGURE 7—LNG Export Capacity and Southbound Louisiana Flow through 2027



While southbound flows are expected to plateau at approximately 12 Bcf/day in 2023 forward (as compared with only 7.5 Bcf/day as recently as 2019), the growth in LNG export capacity does not slow down or plateau. The discontinuity between the two forecasts represents the constraints in north-south capacity from the northeast, meaning that Henry Hub and other locations in Louisiana will presumably suffer from constrained pricing, meaning significant increases.

At the same time, northeast production growth in the Marcellus and Utica shales continues to grow, hampered only by takeaway capacity. Figure 8 shows RBN's constrained and unconstrained forecasts of production through 2027.

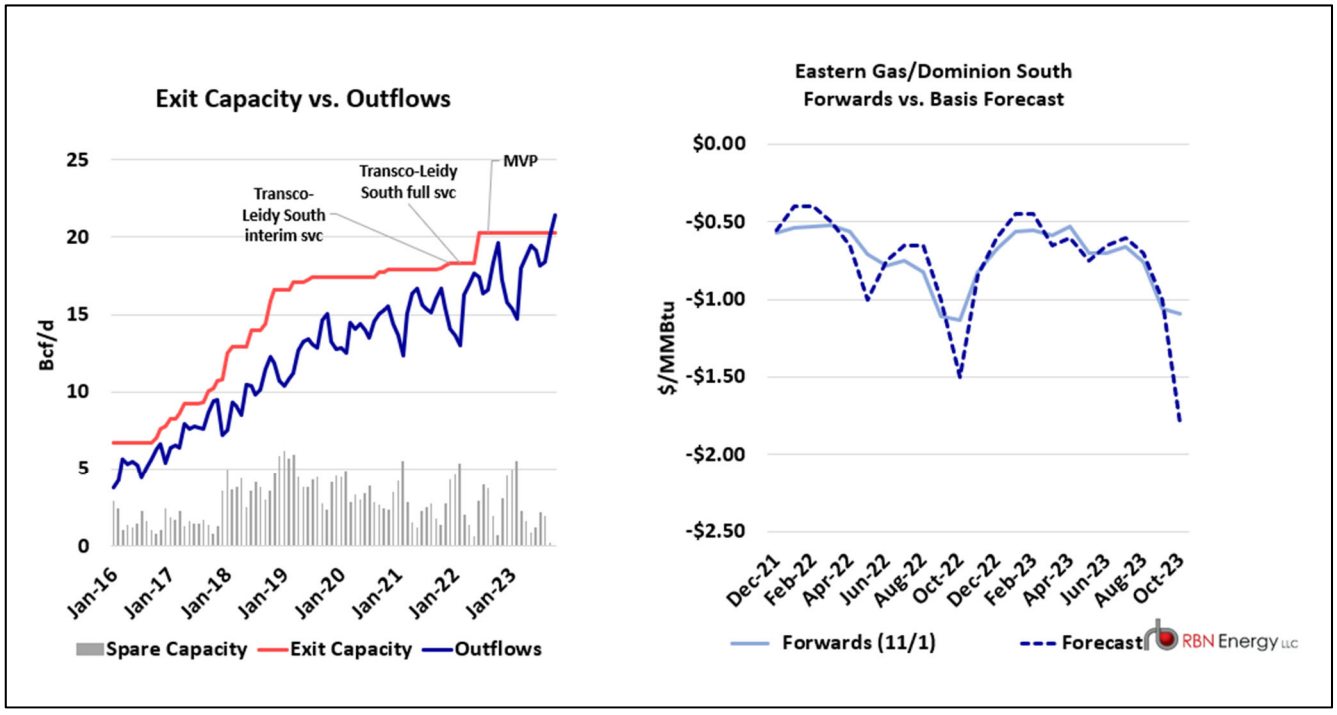
FIGURE 8—Northeast Production Through 2027 Constrained and Unconstrained



Unconstrained, production reaches as high as 40 Bcf/day. By comparison, when the shale revolution began in 2008, the entire U.S. production of natural gas was only 50 Bcf/day.

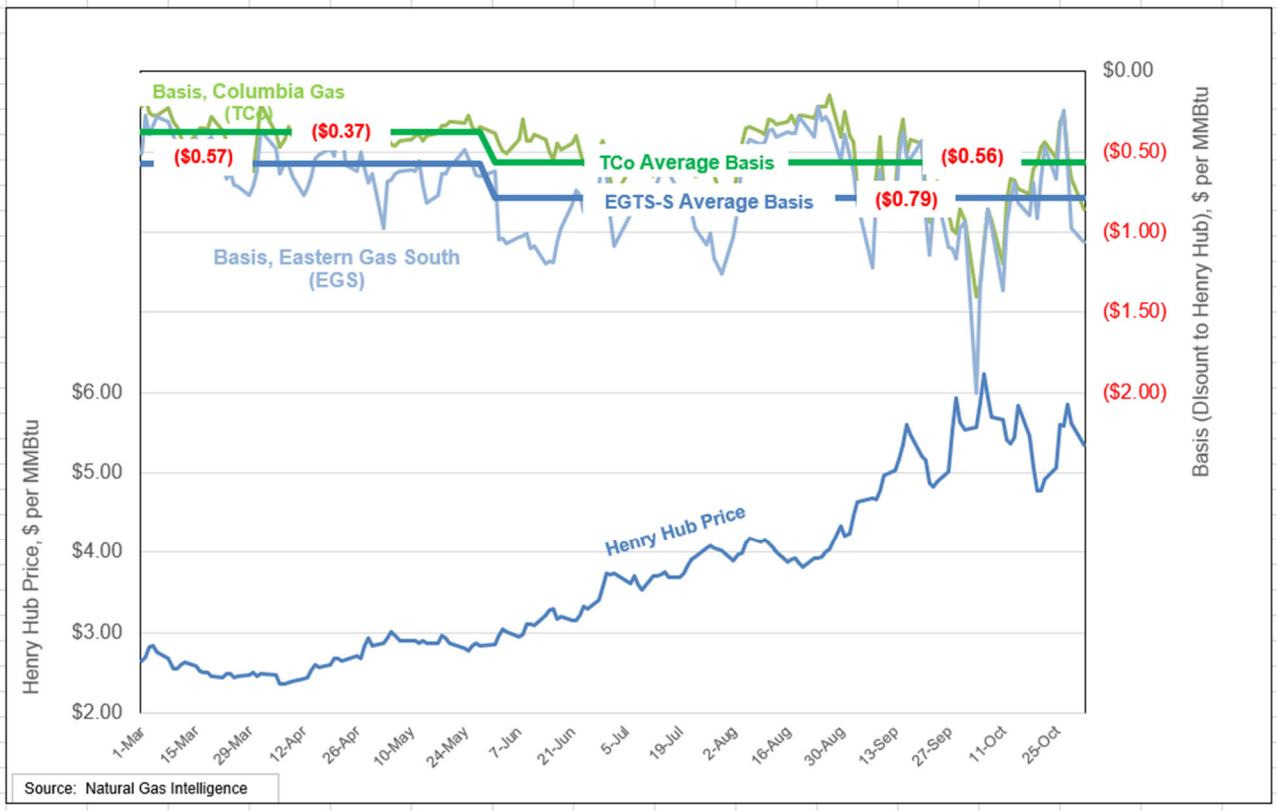
As production begins to encounter new takeaway constraints, the impact on northeast pricing will be immediate and significant. Figure 9 shows the pattern of production and takeaway capacity that results in constraints in just over a year, in 2023 (the chart on the left). The chart on the right compares the forward basis market and RBN's own forecast of basis. Essentially, EGTS plummets in price from a negative basis of $0.55 now, to a negative $1.80 in 2023. If in fact this situation causes production to plateau at the "constrained level" discussed above, prices should stabilize at the negative $1.80 basis until more capacity is built. However, if production growth should continue to grow toward the unconstrained level, prices will fall even further. Given the current upward trend gas prices generally and specifically at Henry Hub, the northeast prices will offer considerable relief to the consumers who can gain access to them.

FIGURE 9—Northeast Production through 2023 vs. Takeaway Capacity and Basis Impact



The relief from escalation in Henry Hub prices in the current environment is already taking place in northeastern supplies from Marcellus and Utica. As absolute prices have gone up, the negative basis to the northeast has widened. Figure 10 depicts this effect, over the course of 2021. As shown, as prices have climbed during the year, basis at EGTS and TCo has widened, from negative $0.57 and negative $0.37 respectively, to negative $0.79 and $0.56.

FIGURE 10—EGTS and TCo Basis, vs. Henry Hub Price, March-November 2021



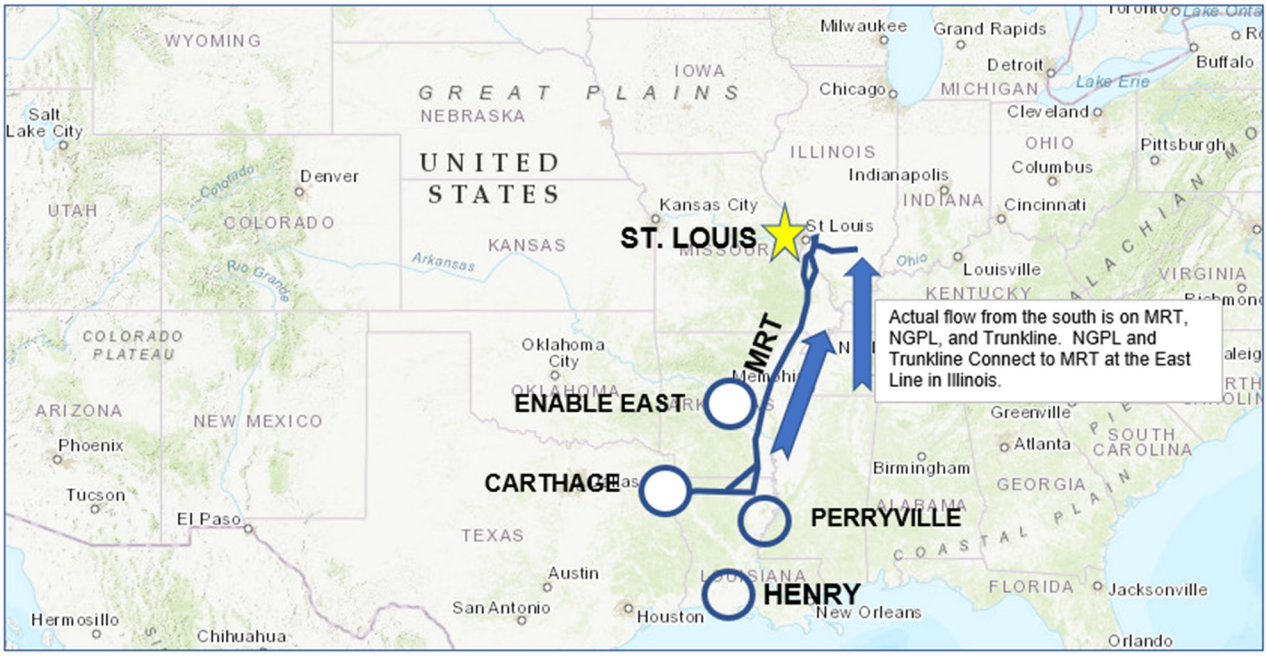
The REX Zone 3 pricing available at the inlet to STL Pipeline reflects several factors. First, it reflects the low, pipeline-constrained prices in Marcellus and Utica. Second, it reflects direct competition with the Cheyenne Hub in northern Colorado and southeastern Wyoming, the primary source of Rockies and DJ Basin gas into REX. Third, it reflects market demand in Chicago and other major population centers in the Midwest. All of the listed supply areas tend to exhibit depressed prices, the northeast because of pipeline constraints and the Rockies because of limited accessible markets. On the demand side, the Chicago market has long been very amply supplied and thus probably the most competitive demand market in the nation, with access to Canadian gas, Rockies gas, southwestern gas from the Permian Basin and the Anadarko, and northeastern gas from Marcellus and Utica. This abundance of access (and the midwestern supply glut discussed earlier) causes Midcontinent prices to stay low.

Because of the multiple factors affecting REX Zone 3 pricing, it is not known how much of this basis impact will directly manifest itself at the inlet of STL Pipeline. However, a decline of more than a dollar in the price at EGTS will likely exert downward pressure on REX Zone 3 and continue to provide a lower source of supply to the St. Louis market.

The end result of RBN's supply analysis is simple: Spire STL's connection to REX Zone 3 provides full access to widely diverse supply areas, to some of the least expensive supply areas in the nation, and substantial protection against weather events in specific regions. It also protects against pipeline failures or other upsets in the delivery infrastructure. Because gas cost is flowed directly through to consumers, it is the consumers who have benefited and will benefit from these impacts in terms of both reliability and cost. Without STL Pipeline, those same consumers would be confined to southern supplies (the epicenter of the price fly-up in February—Oklahoma saw the most severe spike) and would be exposed to the risk of single-pipeline failures that could cause profound damage to the St. Louis area.

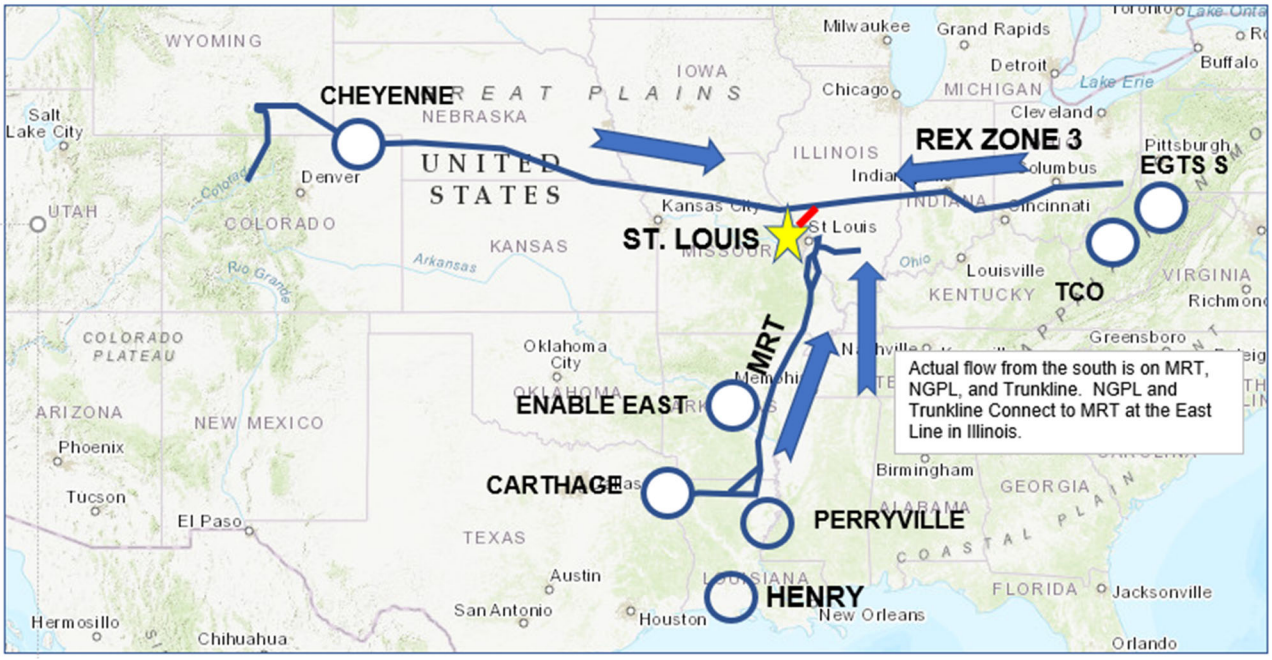
The degree to which STL Pipeline changes the St. Louis Metropolitan Area's risk profile and optionality is truly impressive. Figure 11 shows the basic major-supply configuration for Spire Missouri prior to STL Pipeline, along with the supply pricing nodes accessed. Although some supply came in through MoGas and Southern Star, it was very small compared with the volume that relied on MRT.

FIGURE 11—Spire Missouri Supply Profile Before Spire STL



STL Pipeline has profoundly changed that. Figure 12 maps the situation after STL Pipeline went into service, showing the greatly expanded geographic footprint and additional supply areas afforded by a 65-mile pipeline.

FIGURE 12—Spire Missouri Supply Profile After Addition of Spire STL



Now the St. Louis Metropolitan area has relatively balanced access to three widely diverse areas of supply, the traditional Texas/Louisiana/Oklahoma supplies provided through MRT and its upstream suppliers on the East line, The Rocky Mountains and prolific DJ Basin from Cheyenne, Wyoming, and the abundant, low-cost supplies from Marcellus and Utica in the northeast. This configuration gives a great deal more supply security, as well as the opportunity to optimize prices for the benefit of consumers.

IV. ST. LOUIS AREA MARKET DYNAMICS—PHYSICAL VALUE OF STL PIPELINE

St. Louis and its surrounding suburbs ("St. Louis Metropolitan Area") primarily receive natural gas service from Spire Missouri and Ameren Missouri ("Ameren"), both of which are utilities regulated by the Missouri Public Service Commission.[4] Both are physically supplied by MoGas, an interstate pipeline running from north-central Missouri into the St. Louis metropolitan area and across the Mississippi River into Illinois, where it connects with MRT. MRT is the long-time supplier to both utilities, moving supplies from the Gulf Coast, from an interconnection with its affiliate Enable Gas Transmission, and from interconnections with Trunkline Gas Company ("Trunkline"), and Natural Gas Pipeline Company of America ("NGPL"), which are largely supplied from the Southwest and Louisiana. MRT feeds Spire Missouri on the far eastern side of the Spire Missouri system. The natural gas consuming market in the area is experiencing a significant shift from east to west, wherein growth in the west is a dominant driver of capacity concerns.[5]

The STL Pipeline allows MoGas to serve western St. Louis.

Pressure and supply in the western suburbs of St. Louis depend heavily on MoGas and to a lesser degree on Southern Star. STL Pipeline interconnects with MoGas on the northeast side of St. Louis and delivers into MoGas at high pressure allowing the MoGas system to serve growing demand in the western suburbs. MoGas has stated that without the pressure enhancements provided by the STL Pipeline, adequate supply and pressure cannot be maintained into the western suburbs, which, absent major additions of capacity through looping or compression on MoGas, would significantly endanger reliability.[6]

The STL Pipeline allows for replenishment of Lange Storage Field.

Additionally, the entire Spire Missouri system's winter operations depend heavily on the on-system Lange Storage Field ("Lange"), located in the northeast portion of Spire Missouri's service territory. Lange must be filled coming into the winter, but because it has unusually high deliverability, Lange faces depletion of inventory that reduces deliverability if it is not replenished during the winter.[7] Previously, this was accomplished by operation of 70-year-old compression, which was a significant pollution emitter.[8] The superior pressure offered by the STL Pipeline makes it possible to inject into Lange with no compression, enabling continuous replenishment as the winter progresses. Replenishment, especially during the winter heating season, requires a great deal of supply that is not available without STL Pipeline.

It is particularly important to recognize the critical role played by storage being maintained at high-inventory levels throughout the winter. Many underground storage fields are designed to

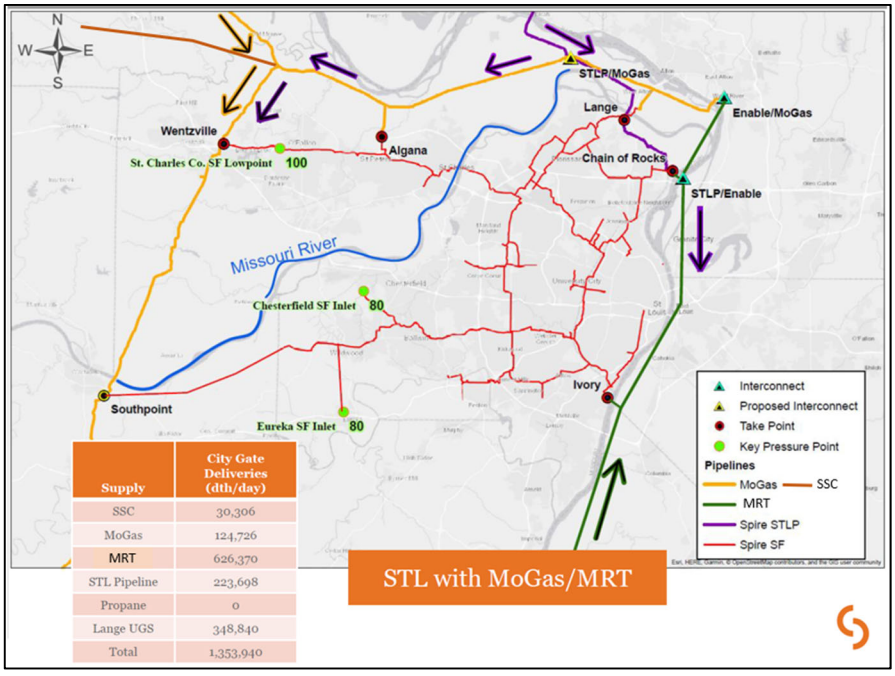
[4] Docket No. CP17-40-007, Motion to intervene out of time of MoGas Pipeline LLC and Comments in Support, July 28, 2020 ("MoGas Comments"), p. 5.
[5] Affidavit of Scott Carter, MoGas Comments § IV, ¶ 1, p. 5. In addition, Spire STL will be presenting the report of Bruce Katz to further demonstrate the population shift occurring in the St. Louis metropolitan Area.
[6] MoGas Comments, § 3, pp. 2-3.
[7] Docket No. CP17-40-007, Response to August 6, 2021 Data Request, OEP/DPC/CB-1, § 375.308(x)(3), September 7, 2021 ("Response to Staff Data Request"), No. 15, CP17-40-___, Affidavit of Scott Carter, July 26, 2021 ("Carter Affidavit"), § 11, p. 4.
[8] Response to Staff Data Request No. 15.

hold large inventories, yet offer maximum deliverability that is relatively modest and can be maintained over the key periods during the winter without significant reinjection. Those fields require very large inventory cost and tend not to offer short-term operational response to rapidly changing weather. Lange is different, offering 357,000 Dth/day,[9] but remaining critical in terms of total volume throughout the winter. Since it has high deliverability, the inventory risks being depleted during the winter without constant attention and frequent replenishment.[10] It is not operationally prudent to go into February and March without the full capability to respond to changing weather. In a year when the draws on storage are high in December and January, full reinjection must be available to be ready for whatever weather pattern emerges. The absence of environmental impact and of additional operating cost offered by a high pressure pipeline supply (STL Pipeline) that can simply inject at line pressure is extremely valuable.

The STL Pipeline delivers into MRT to serve Spire Missouri.

The bulk of the STL Pipeline deliveries are made directly into the Spire Missouri system, or into MRT for southbound flow, to the Southeast side of Spire Missouri's system. Figure 1 is a map depicting these dynamics. As may be seen from Figure 13, STL Pipeline enters from the north (the purple line), crosses MoGas (the gold line), connects at Lange to deliver into Spire Missouri, then again at Chain of Rocks to deliver into Spire Missouri and into MRT for southbound flow, where the gas is delivered into Spire Missouri's system at Ivory. In other words, the Project is a pervasive and integral part of the operation of three systems: MoGas, Spire Missouri, and MRT.

FIGURE 13—Configurations and Flows in and around St. Louis with STL Pipeline[11]



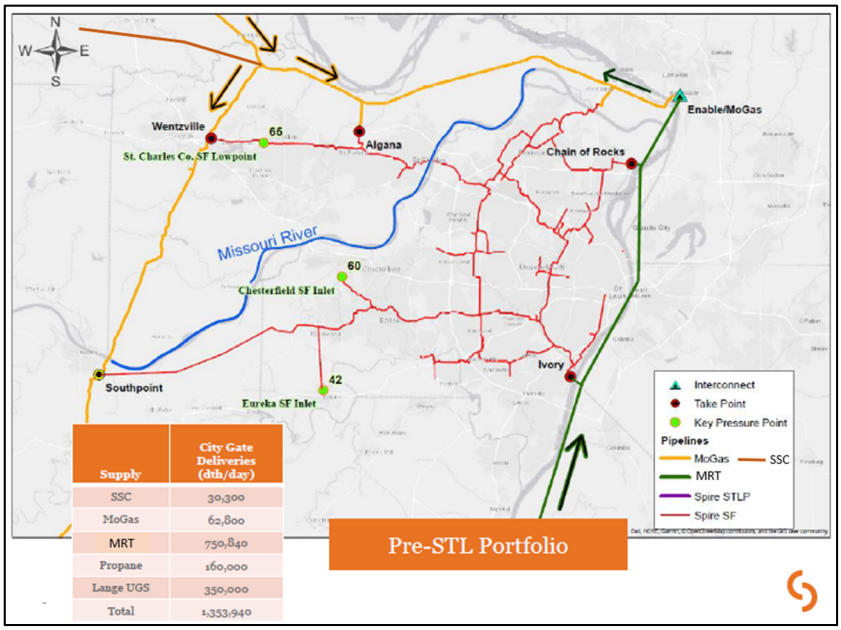
Supply	City Gate Deliveries (dth/day)
SSC	30,306
MoGas	124,726
MRT	626,370
STL Pipeline	223,698
Propane	0
Lange UGS	348,840
Total	1,353,940

[9] Carter Affidavit, p. 7, Table 1.
[10] Carter Affidavit, pp. 8-9, ¶ 19.
[11] Response to EDF data request in Missouri PSC proceeding, Updated Final MoEast Supplier Presentation, February 3, 2020 ("MoEast"), p. .5.

Current Market Conditions demonstrate the need for the STL Pipeline.

The situation that existed before the STL Pipeline is depicted in Figure 14, below. Note that MRT only feeds the Spire Missouri system from the east, when the primary load growth on Spire Missouri is in the west. MoGas feeds the area from the northwest, but prior to STL Pipeline going into service, its flow split to be able to serve both northern St. Louis and the western suburbs. MRT interconnected with MoGas, but at lower pressure than was necessary for storage injections or reinforcement of the MoGas ability to push more gas to the western side of the market. It is the western suburbs where significant growth is being experienced and a specific need had to be met.

FIGURE 14—Configuration and Flows in and around St. Louis prior to STL Pipeline[12]



The looming deficiencies that existed prior to 2017 would reemerge if the STL Pipeline were not permitted to continue in service indefinitely. These included increasing pressure problems in the west as load shifted to the suburbs, with the primary supply feed (MRT) being only on the east side of St. Louis, overall chronic pressure issues on MRT caused by the pipelines upstream of the East Line, operational issues with direct propane injection, air quality and age issues with compression at Lange, and overall, simply a deficiency of total peak-day supply. Thus, were that to happen, some sufficient alternative would need to be put in place. Spire Missouri has now explored the alternatives that have been identified by Spire Missouri, by parties in this proceeding, and by the FERC Staff in its data requests. Spire Missouri has responded to extensive discovery from the FERC Staff as to the merits or deficiencies of the various options.[13] As noted, part of RBN's assignment in this case is to examine the same alternatives and confirm or refute their effectiveness, and to evaluate the cost and benefits of each alternative.

[12] MoEast, p. 3.
[13] Response to Staff Data Request Nos. 1, 2, 3, 6, 7, 9, 10, 11, 14, 15.

V. IDENTIFIED ALTERNATIVES TO THE STL PIPELINE

As noted in Section I, RBN was asked to review the capabilities of the pipelines immediately available to Spire Missouri, to assess whether they can deliver enough supply for the supply deficiency that would be created if the Project were not in service.[14] Once the STL Pipeline commenced service, Spire Missouri was able to allow various contracts to expire, in order to avoid burdening its customers with redundant costs that were no longer necessary because STL Pipeline had replaced their function. Both MoGas and Southern Star have indicated that they are not able to provide more supply to serve the western areas of the St. Louis region without constructing major projects resulting in both significant land and environmental impact and high cost.[15] MRT has indicated that it has 165,849 Dth/day available on its East Line for the coming winter.[16] However, upstream capacity is required to bring supply to the MRT East Line, and these deliveries to MRT's East Line have a long history of pressure levels that are inadequate to accommodate the operations of Spire Missouri.[17] Additionally, the pressures involved would not resolve the issue of winter replenishment of Lange storage, or the supply/pressure deficiencies identified in the western areas of the St. Louis region on Spire Missouri's system. Finally, even if Spire Missouri contracted for and could transport all of the available MRT East Line capacity, it remains well short of the 350,000 Dth/day provided by Spire STL.

Putting aside the situation faced in the coming winter, reliance on MRT supply from the East into the future would require major upgrades and revisions to Spire Missouri's facilities. The Chain of Rocks city-gate station which previously received gas only from MRT has now been abandoned and replaced with a new station fed by both MRT and STL Pipeline and operated by STL Pipeline The new station would have to be conveyed to either Spire Missouri or MRT. The transaction would additionally require the acquisition by Spire Missouri of 6.9 miles of STL Pipeline's system in order to provide the necessary interconnections between MRT and MoGas.[18] There may be jurisdictional questions related to the acquisition of this segment of pipe which are beyond the scope of this report but could delay any transaction. However, because MRT, unlike STL Pipeline, operates at a pressure inadequate to provide enough pressure to MoGas to increase capacity in the west,[19] the problem of serving the growing western suburbs would not be solved.

Some new propane injection equipment would be required at Lange and would need to be constructed as the preexisting facility was dismantled.[20] At the southern propane injection point at Catalan, the propane supply has been disconnected and the supplying pipeline has

[14] As part of this analysis, RBN reviewed a separate analysis conducted by Black & Veatch Management Consulting, LLC, entitled, "Updated: Review of Current Natural Gas Infrastructure Serving the Greater St. Louis Market and Potential Supply Disruptions During Peak-Day Demand," and included as Appendix A hereto. This analysis helped inform RBN as to how a shut-down of the STL Pipeline would affect the eastern Missouri gas market.
[15] MoGas Comments, p. 6, Docket No. CP17-40-007, Motion to Intervene and Comments of Southern Star Central Pipeline, Inc, September 7, 2021 ("Southern Star Comments"), p. 3.
[16] Docket No. CP17-40-007, Reply Comments of Mississippi River Transmission LLC, October 5, 2021, p. 2.
[17] Response to Staff Data Request No. 2.
[18] Response to Staff Data Request No. 2c.
[19] MoGas comments p. 5.
[20] Prior to STL Pipeline's going into service, propane injection was installed and operated at both Lange (which is also the location of the Lange storage field) and Catalan.

issues that would have to be addressed.[21] There are additional issues with the use of direct-injection propane supply that are being studied and would need to be addressed.[22]

The most daunting task would be the expansion of service to the western suburbs the area, as noted above, of the primary growth that is occurring for Spire Missouri, with any replacement gas coming from the East. Such supply cannot reasonably come from the west, from MoGas or Southern Star, according to their respective comments. Both are constrained and would need substantial expansions to be able to provide additional service on the western side of the St. Louis Metropolitan Area.[23] Absent such expansions, to expand the system from the east, Spire Missouri would need to construct new, large-diameter, high-pressure pipelines across heavily populated areas of St. Louis, an undertaking that would be both highly impactful from an environmental standpoint and costly to ratepayers in the region.[24]

VI. COST OF ADAPTATION TO ALTERNATIVES

Reference has been made multiple times to the cost of adaptation to the identified alternatives. The components of those costs include:

- Partial reconstruction of the propane-injection facility at Lange;
- Significant modernization at Catalan;
- Partial replacement of a section of the aging propane supply line;
- Purchase by Spire Missouri and repurposing of the Chain of Rocks city-gate station;
- Expansion of the western side of the Spire Missouri system with new pipelines;
- Looping the MoGas line into the western side of the Spire Missouri System; and
- Looping Southern Star's 200-mile "Little Mo" line.

The cost of the propane reconstruction and other measures have been estimated by Spire Missouri at a minimum of $2M, plus whatever upgrades are necessary at Catalan—all at a time when the future of propane in this role is in doubt (meaning that long-term, a replacement with another technology would be likely).[25] The capital cost of the purchase of the Chain of Rocks city-gate station and of the 6.9 miles of STL Pipeline pipe for purposes of interconnection totals approximately $53.9 million,[26] based on net book value,[27] implying an average cost-of-service impact of $6.1 million annually. The three pipeline alternative projects have been estimated using a combination of intelligence from the MoGas and Southern Star comments, and RBN's proprietary pipeline estimation model. The results are set forth in Figure 15. All are well above the $0.25 charged by STL Pipeline, and except for the estimate of the MoGas increase, well above STL Pipeline's maximum tariff rate of $0.357.[28]

[21] Response to Staff Data Request No. 13.
[22] Carter Affidavit, p. 17, ¶ 44.
[23] See Footnote 12.
[24] Response to Staff Data Request No. 10.
[25] RBN is unaware of any other gas utility in the nation that uses direct injection of propane because of its impact on equipment and appliance performance, interchangeability with natural gas, and air quality.
[26] Staff Data Request No. 2c, $20.6 million for Chain of Rocks, $33.3 million for pipeline segment.
[27] Id.
[28] Further, the pipeline solutions could likely not be in service for the2022-23 winter.

FIGURE 15—Cost and Rate Impact of Pipeline Alternatives to STL Pipeline

Alternative Project	Source	Estimated Cost Per inch-mile	Miles	Diameter, Inches	Estimated CAPEX	Estimated Cost of Service	Pressure psig	Estimated Capacity, Dth/d	100% LFRate
Loop MoGas 2_/	MoGas Comments		50		$100,000,000	$11,400,000		90,000	$0.35
Full Loop of Southern Star Little Mo Line 2_/	SSC Comments	$141,203	200	8	$225,924,274	$25,755,367	1,113	67,867	$1.04
Expand Spire Missouri System 2_/	DR 10	$500,000	25	20	$250,000,000	$28,500,000	222	89,032	$0.88

1_/ CAPEX: Transfer of Chain of Rocks from STL to Spire Missouri: $20.6 million. plus transfer of 6.9 mi. of STL pipeline to Spire MIssouri
Transfer of 6.9 mi. of STL pipeline to Spire Missouri: $33.3 million. This does not include cost of piping modifications or other adaptation.

2_/ Unless otherwise stated, cost factors, estimated cost of service factors, and capacity are based on RBN pipeline estimation model. MoGas provided its CAPEX estimate. The cost per inch-mile for Southern Star was estimated using the CAPEX, diameter, and mileage from the STL Pipeline original application, and is consistent with RBN's experience in similar population/terrain environments. THe cost per inch-mile for reinforcement of the Spire Missouri system, through a heavily populated urban environment was conservatively estimated based upon other urban experience, wherein densely populated areas ranged as high as $833,000 and medium-population surburban areas were $400,000 - $500,000 per inch-mile.

VII. CONCLUSION

The STL Pipeline is solidly supported by fundamentals, superior to any realistic alternatives, and has been proven in practice by a two-year "bench test" demonstrating that it is needed to provide reliable and economic service to consumers in the St. Louis region. It diversified supply, giving consumers choices of supply from the northeast and from the Rockies, in addition to the existing access to Louisiana and Oklahoma. In doing so, it allows consumers to take advantage of direct competition between gas from the northeast and the Rockies on a single pipeline, REX, with that competition coming to a head in the exact area where the STL Pipeline connects with REX. And it shielded, and continues to shield, consumers from market disruptions such as that caused by Winter Storm Uri and from the strong pull on Gulf Coast and southwestern supplies by LNG exports. Further, the STL Pipeline addressed the shifting load patterns from east to west in the St. Louis region, allowing that growth to be reliably served with minimal construction.

APPENDIX A

UPDATED: REVIEW OF CURRENT NATURAL GAS INFRASTRUCTURE SERVING THE GREATER ST. LOUIS MARKET AND POTENTIAL SUPPLY DISRUPTIONS DURING PEAK-DAY DEMAND

PREPARED FOR

Spire STL Pipeline LLC

10 NOVEMBER 2021

BLACK & VEATCH

Special Notice

In conducting our analysis and in forming an opinion of the projection of future operations summarized in this report, Black & Veatch has made certain assumptions with respect to conditions, events, and circumstances that may occur in the future. The methodologies we utilize in performing the analysis and making these projections follow generally accepted industry practices. While we believe that such assumptions and methodologies as summarized in this report are reasonable and appropriate for the purpose for which they are used; depending upon conditions, events, and circumstances that actually occur but are unknown at this time, actual results may materially differ from those projected.

Use of this report, or any information contained therein, shall constitute the user's waiver and release of Black & Veatch from and against all claims and liability, including, but not limited to, any liability for special, incidental, indirect or consequential damages, in connection with such use. In addition, use of this report or any information contained therein shall constitute an agreement by the user to defend and indemnify Black & Veatch from and against any claims and liability, including, but not limited to, liability for special, incidental, indirect or consequential damages, in connection with such use. To the fullest extent permitted by law, such waiver and release, and indemnification shall apply notwithstanding the negligence, strict liability, fault, or breach of warranty or contract of Black & Veatch or Client. The benefit of such releases, waivers or limitations of liability shall extend to Black & Veatch related companies, and subcontractors, and the directors, officers, partners, employees, and agents of all released or indemnified parties. USE OF THIS REPORT SHALL CONSTITUTE AGREEMENT BY THE USER THAT ITS RIGHTS, IF ANY, IN RELATION TO THIS REPORT SHALL NOT EXCEED, OR BE IN ADDITION TO, THE RIGHTS OF THE CLIENT.

This report was prepared by Black & Veatch Management Consulting LLC ("Black & Veatch") and is largely based on information not within the control of Black & Veatch. As such, Black & Veatch has not made an analysis, verified, or rendered an independent judgment of the validity of the information provided by others, and, therefore, Black & Veatch does not guarantee the accuracy thereof.

Readers of this report are advised that any projected or forecasted financial, operating, growth, performance, or strategy merely reflects the reasonable judgment of Black & Veatch at the time of the preparation of such information and is based on a number of factors and circumstances beyond our control. Accordingly, Black & Veatch makes no assurances that the projections or forecasts will be consistent with actual results or performance. To better reflect more current trends and reduce to chance of forecast error, we recommend that periodic updates of the forecasts contained in this report be conducted so more recent historical trends can be recognized and taken into account.

Any use of this report, and the information therein, constitutes agreement that: (i) Black & Veatch makes no warranty, express or implied, relating to this report, (ii) the user accepts the sole risk of any such use, and (iii) the user waives any claim for damages of any kind against Black & Veatch.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

1.0 Executive Summary

Black & Veatch Management Consulting, LLC (Black & Veatch) was retained by Spire STL Pipeline LLC (Spire STL) to review existing gas infrastructure in the Greater St. Louis market for winter peak day needs in the upcoming winter season and estimate the potential impact to natural gas consumers in the region if Spire STL Pipeline (STL Pipeline) is not operational during that time.

This report was originally developed in September 2021 to specifically addresses data request #12 in the Data Request dated August 6, 2021 from the Federal Energy Regulatory Commission's (FERC) Office of Energy Projects to Spire STL: "Describe whether other customers, aside from Spire Missouri, including those on other interstate pipelines, would experience disruptions to service if the STL Pipeline ceased operations."

This report was updated in November 2021.

Scope of Work

Black & Veatch's scope of work includes:

- General Market and Current Infrastructure Overview
- Estimated Winter Peak-Day Demand
- Firm Gas Supply to Serve Winter Peak-Day Demand
- Industrial, Commercial, and Electric Utility Consumers without Firm Utility Supply
- Potential Gas Curtailments on a Peak Winter Day if STL Pipeline is Not Operational
- Potential Impact to Regional Gas Demand from Increased Gas Fired Generation

In conducting this market assessment, professionals from Black & Veatch (1) reviewed publicly available data and documents, as identified in the report, (2) reviewed relevant documents and projections provided by Spire STL, and (3) conducted discussions with Spire STL representatives. This report summarized Black & Veatch's findings from the review.

1.1 Summary of Findings

The greater St. Louis market is served by three natural gas utilities, Spire Missouri Inc. (Spire Missouri), Union Electric Company D/B/A Ameren Missouri (Ameren Missouri), and Ameren Illinois. As the gas supplier to their firm customers – primarily residential and commercial customers, natural gas utilities must hold sufficient firm transportation capacity on interconnecting pipelines to meet their firm customers' gas demand on the winter peak day.[1] Other customers behind their city-gates, including some commercial, industrial, and electric utility customers, choose to use "transportation only" service on the utility systems. These customers rely upon firm transportation capacity held by themselves, natural gas marketers, and firm transportation capacity released by natural gas utilities during non-peak conditions when the capacity is not expected to be used.

For example, Symmetry Energy Market Solutions (Symmetry) and Spire Marketing, Inc. are both natural gas marketers who serve primary and secondary schools, hospitals, and large industrial

[1] Black & Vetch uses winter "peak-day" to indicate the weather conditions that utilities need to plan for its firm customers. Some may refer it as "design day".

customers[2] in the greater St. Louis market, procuring and transporting gas supplies to utility city-gates using, in part, recallable firm capacities released by regional utilities. The customers served by marketers have limited fuel alternatives and can be curtailed under peak-day demand conditions when released capacity is recalled by the utilities in order to meet utility firm customers' gas needs.

Black & Veatch's analysis showed that under current market demand and supply infrastructure conditions, without the STL Pipeline, Spire Missouri will have a supply shortfall of at least 272,800 Dth/day[3] to meet its peak-day firm customers' needs.

In addition, without the STL Pipeline, a significant number of industrial, commercial, and electric utility gas consumers in the greater St. Louis market could experience gas service disruptions as they rely upon released capacity from utilities to meet their day-to-day gas needs. Black & Veatch estimated that supply curtailments to these customers could reach approximately 82,000 Dth/day on a winter peak day.

If regional gas demand and supply infrastructure remain unchanged from the current situation, without the STL Pipeline, similar supply shortfalls could persist during peak winter day in the future. Moreover, future supply shortfall could widen when Ameren Missouri retires its Rush Island coal facility earlier than the 2039 date assumed in its recent Integrated Resource Plan (IRP),[4] if part of the electric generation from that facility is replaced with gas fired generation. As an example, based on Rush Island's average electric generation for the past three years, if 50% of this generation were to be replaced by natural gas, the winter peak day supply shortfall could increase by approximately 79,000 Dth/day if the STL Pipeline is not in service.

In general, the Black & Veatch analysis demonstrates that without the STL Pipeline, there will be a shortage of firm pipeline capacity into the greater St. Louis market that could result in curtailment of deliveries to industrial, commercial and residential customers on a peak winter day under current supply conditions.

Black & Veatch's key observations are presented below.

Without the STL Pipeline, there are not sufficient firm supply sources to meet Spire Missouri's natural gas needs on a winter peak-day.

If the STL Pipeline is not operational, there will be a shortfall of approximately 272,800 Dth/day in Spire Missouri's portfolio to meet its customers' approximately 1.3 Bcf/day of peak-day gas demand. There is not sufficient and available firm pipeline capacity on Enable MRT (MRT), MoGas Pipeline (MoGas), and Southern Star Central (Southern Star) to offset the loss of STL Pipeline capacity and meet Spire Missouri customers' peak-day demand. The estimated shortfall of 272,800 Dth/day assumes that Spire Missouri's Lange Storage (Lange) has sufficient inventory to support a

[2] In this report, the term "customers" shall mean broadly those that receive natural gas services, either from utilities in the region and from other natural gas market participants in the region.
[3] Spire Missouri holds 350,000 Dth/day of capacity on STL Pipeline, however, only 190,000 Dth/day of capacity is relied upon for gas supply directly to Spire Missouri's city-gate. The remaining 160,000 Dth/day of supply relies upon MRT and MoGas capacity to reach the Spire Missouri city-gate. In this report, Mcf, Dth and MMBtu are assumed equivalent.
[4] Ameren IRP, Executive Summary Page 4, available at https://www.ameren.com/-/media/missouri-site/files/environment/irp/2020/ch1-executive-summary.pdf?la=en-us-mo&hash=67ECB83304090AE189E1528AABDD2211E5A091BC

deliverability of 357,000 Dth/day. If Lange inventory levels are not able to support that level of deliverability, the supply shortfall could be greater.[5]

Without the STL Pipeline, a significant number of industrial, commercial, and electric utility gas consumers in the greater St. Louis market could experience gas service disruptions as they rely upon released capacity from utilities to meet their day-to-day gas needs.

On average, Spire Missouri and Ameren Missouri provide approximately 129,000 Mcf/day and 24,000 Mcf/day,[6] respectively, of transportation-only services to industrial, commercial, and electric utility consumers behind their city-gates.

Approximately 17,747 Dth/day of upstream firm transportation capacity is directly held by industrial, commercial, and electric utility gas consumers or gas marketers to serve these transportation-only customers. These consumers obtain transportation services from the utilities, and their gas supplies from marketers that rely on capacity that has been released to transport that supply to market. This released capacity is subject to recall. Without STL Pipeline in operation, Spire Missouri and Ameren Missouri would be forced to recall released firm transportation capacity to meet peak-day gas demand on a more frequent basis. Industrial, commercial, and electric utility consumers that rely on recallable released capacity will lose access to gas supply and be subject to curtailment. The amount of curtailment for these transportation-only customers in the greater St. Louis market could approach approximately 82,000 Dth/day.

If Ameren Missouri chooses to retire the existing Rush Island facility early, and some portion of Rush Island's generation output is replaced with gas-fired generation, the regional supply gap could widen without STL Pipeline and incremental capacity would be needed to serve the St. Louis region.

The August 2021 Federal Appeals Court ruling that upheld a 2019 decision which ordered Ameren Missouri to install pollution controls at its Rush Island power plant could add incremental costs to retrofit the coal plant.[7] This court ruling could change Ameren Missouri's plan to keep the Rush Island Generation Facility open until 2039, as stated in its 2020 IRP[8] Black & Veatch reviewed historical Rush Island hourly generation from 2018 through 2021 reported in EPA's Continuous Emissions Monitor (CEMS) data[9] and estimated average equivalent gas requirements to produce the same energy, assuming the average heat rates of existing gas units in the region. During the past three years, Rush Island provided 20,599 MWh of electric generation on average, which, if replaced with natural gas-fired generation, would require up to 157,178 Mcf/day of natural gas as fuel.

Without the STL Pipeline, Spire Marketing would have limited options to meet its obligations to its customers.

Spire Marketing is an independent gas marketer that provides upstream gas supply services to commercial and industrial customers in the greater St. Louis market. Spire Marketing currently holds 10,000 Dth/day of capacity firm transportation capacity on the STL Pipeline to serve transport-only customers behind Spire Missouri city-gate. If Spire Marketing were to lose the STL

[5] Application of Spire STL Pipeline LLC for a Temporary Emergency Certificate, or, in the Alternative, Limited-Term Certificate, FERC Docket No. CP17-40-007, (Jul. 25, 2021), Ex. Z-1, Affidavit of Scott Carter, President of Spire Missouri Inc, at Page 7, P 13.
[6] Based on 2019 EIA Form 176, "Annual Report of Natural and Supplemental Gas Supply and Disposition" data.
[7] U.S. v. Ameren Missouri, 421 F. Supp. 3d 729 (E.D. Mo. 2019), aff'd in part, 9 F.4th 989 (8th Cir. 2021)
[8] Ameren 2020 IRP Executive Summary Page 4
[9] United States Environmental Protection Agency – Air Markets Program Data

Pipeline capacity, this could cause supply disruptions to both Spire Missouri firm customers and commercial and industrial customers who rely upon the released capacity.

STL Pipeline provides high-pressure gas supplies into MoGas, and this enables MoGas to improve general deliverability from its system, in addition to serving Spire Missouri.

MoGas is not directly connected to upstream gas production and is dependent on receipts from interstate pipelines to serve customers in Missouri and Illinois. The additional high-pressure gas supplies from the STL Pipeline have enhanced MoGas' deliverability on the west side of St. Louis and other parts of Missouri. Without the STL Pipeline, MoGas will experience a significant pressure reduction that may impair its ability to provide gas supplies to customers in the greater St. Louis market during peak-day weather events.[10]

[10] USCA Case #20-1016 Document #1910030 - Brief of MoGas Pipeline LLC as Amicus Curiae in Support of Petition for Rehearing or Rehearing EN BANC, page 3

2.0 Greater St. Louis Gas Market Overview

For this report, the greater St. Louis market includes East and Central Missouri market served by Spire Missouri and Ameren Missouri and portions of thirteen counties in Illinois served by Ameren Illinois through Enable MRT East Pipeline (MRT East). The market is located at the terminus of four interstate pipelines and relies upon flowing gas pipeline supplies and gas storage withdrawals from outside the region via interstate pipelines, to meet residential, commercial, industrial, and electric generation natural gas demand. An overview of interstate pipelines serving the greater St. Louis market is included in Figure 2-1 below.

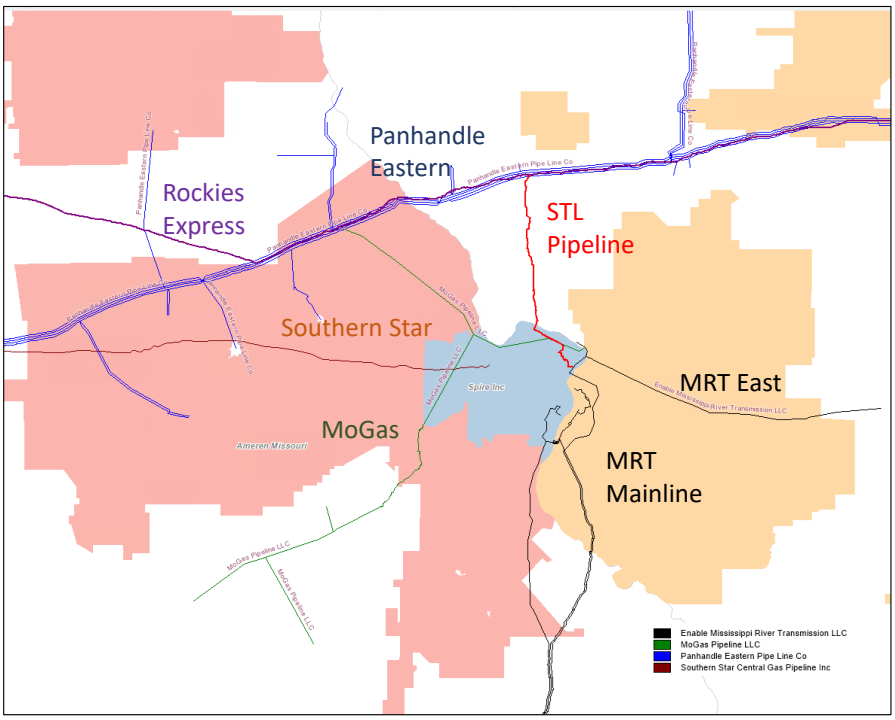


Figure 2-1 – Greater St. Louis Market Natural Gas Infrastructure

Source: Spire Missouri Presentation to MO PUC and Ameren

2.1 Gas Supply and Pipeline Infrastructure

Major interstate pipelines that deliver natural gas supplies directly to the greater St. Louis region include MRT, MoGas, Southern Star, Panhandle Eastern Pipeline (Panhandle) and STL Pipeline. In addition, Spire Missouri has the Lange underground storage facility behind the city-gate that provides gas supplies in the winter. These interconnected pipelines are highly utilized during the peak winter months.

As shown below in Figure 2-2, the MRT pipeline, which has access to traditional Gulf Coast gas supplies from Enable Transmission and Northern Louisiana, is heavily utilized in the winter months, with availability during the summer and shoulder months. Maximum daily deliveries during the winter have reached 533,000 Dth/day to Spire Missouri and 117,464 Dth/day to Ameren Illinois city-gates. The historical maximum daily deliveries do not reflect the winter peak-day conditions that the utilities are required to plan for.

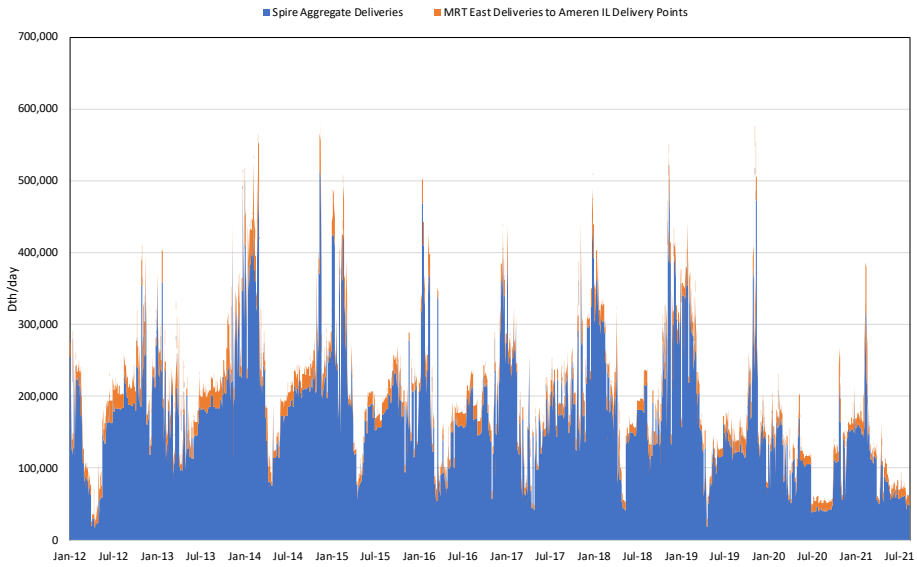


Figure 2-2 – Historical MRT Daily Pipeline Deliveries to Spire Missouri and Ameren Illinois

Source: MRT Electronic Bulletin Board (Delivery Point: Laclede Gas Company – Aggregate, Illinois Power Co /Main Line – Aggregate)

MoGas deliveries to the greater St. Louis market are shown below in Figure 2-3, and follow a similar utilization pattern. MoGas winter peak-day deliveries into the market approached 160,000 Dth/day this past winter.

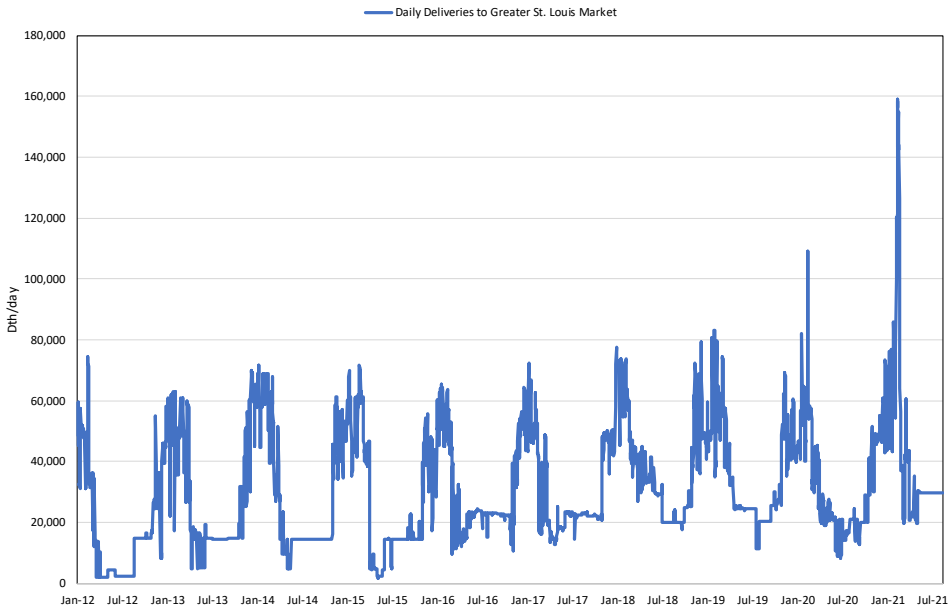


Figure 2-3 – Historical MoGas Pipeline Deliveries to Greater St. Louis Market

Source: MoGas Pipeline Electronic Bulletin Board

Southern Star deliveries to the greater St. Louis market are shown below in Figure 2-4, where pipeline deliveries reached 34,496 Dth/day this past winter.

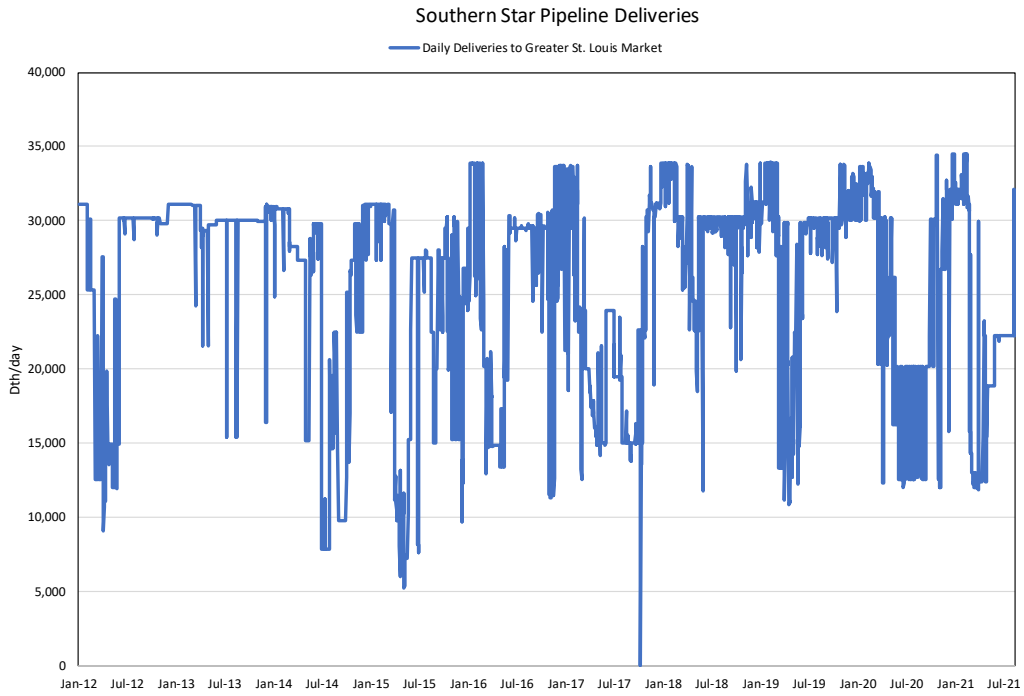


Figure 2-4 – Historical Southern Star Pipeline Deliveries to Greater St. Louis Market

Source: Southern Star Pipeline Electronic Bulletin Board (Ameren Columbia and Laclede Delivery Points)

2.2 Average and Peak-Day Gas Demand

2.2.1 Average Gas Demand

This report focuses on the greater St. Louis market served by three natural gas utilities: Spire Missouri, Ameren Missouri, and Ameren Illinois load served by the MRT East pipeline. This includes the direct gas sales or firm customer needs for each utility, and any transportation on behalf of others. For Ameren Illinois, our focus was on the direct deliveries from MRT East, and its impact on the Greater St. Louis market. As shown in Figure 2-5, total natural gas deliveries in this market have increased moderately, with annual average daily consumption at 486,000 Dth/day in 2015 and 556,863, Dth/day in 2019.

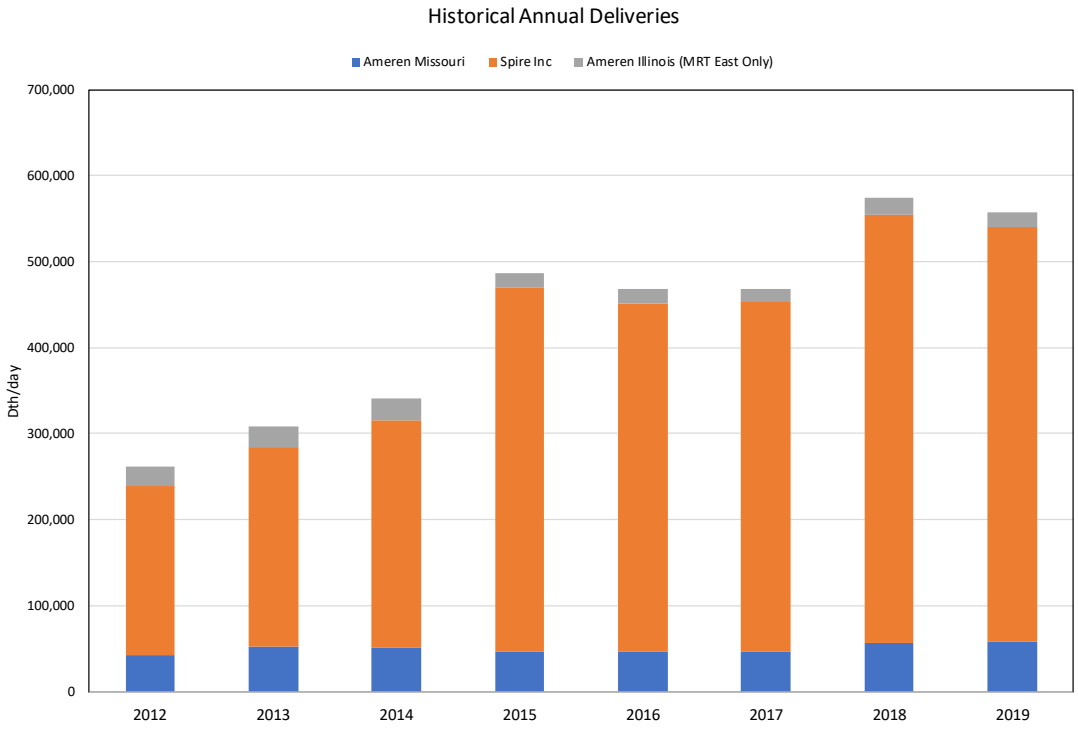


Figure 2-5 – Historical Deliveries to Greater St. Louis Market

Source: MRT Pipeline Electronic Bulletin Board, Form EIA 176 Data

2.2.2 Peak-Day Gas Demand for Firm Utility Customers (excludes industrial, commercial, and electric utility consumers that transport or separately procure gas supplies)

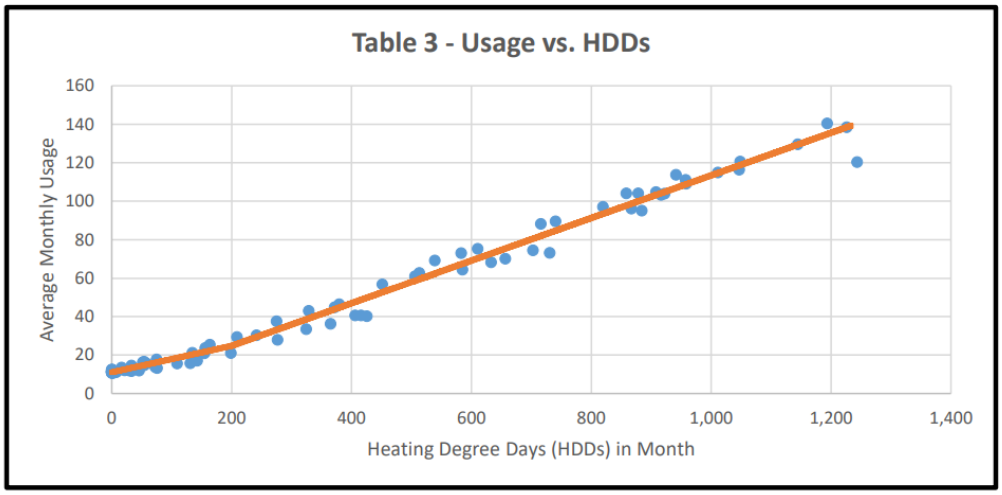
Spire Missouri serves the largest share of firm customer demand of this market. It "undertakes a planning process, consistent with industry standards and audited by the Missouri Public Service Commission, which outlines how it will meet a planned peak-day (i.e. peak customer demand) during the winter heating season. Based on its planning estimates, Spire Missouri would require nearly 1,300,000 Dth of capacity for a planned peak-day."[11] This peak-day need excludes industrial, commercial, and electric utility consumers behind the Spire Missouri city-gate that procures upstream transportation or rely on marketers to deliver gas supplies to the city-gate.

For Ameren Missouri, Black & Veatch estimated the peak-day needs for its "Residential" and "General Service" customers utilizing the methodology and parameters described by Ameren witness Ryan P. Ryterski in his direct testimony before the Missouri Public Service Commission in docket GR-2019-0077. As the detailed numeric data are not directly accessible publicly, Ameren Missouri's peak-day demand is approximated in the following steps:

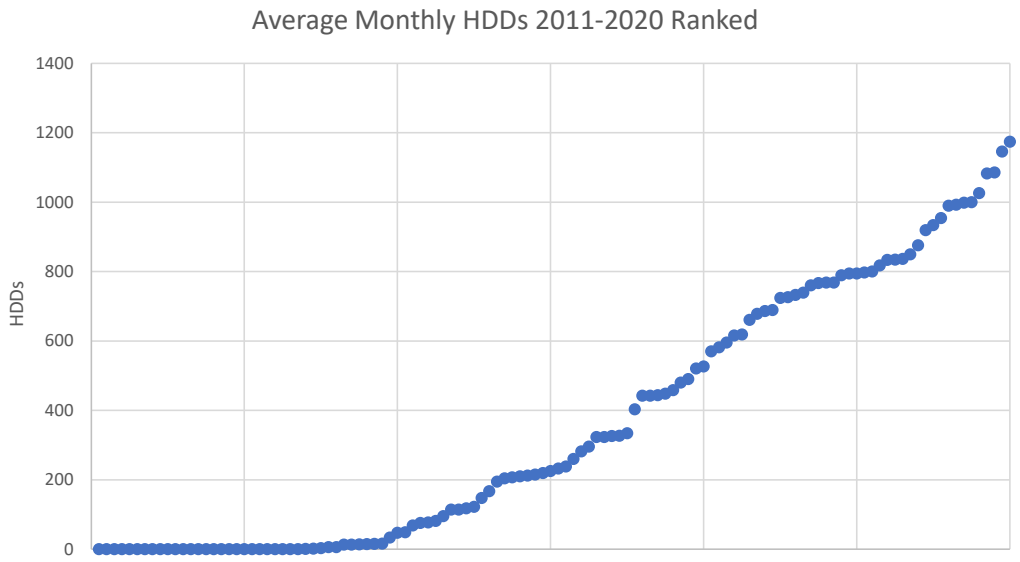
1. Construct historical weather data utilized by Mr. Ryterski using the simple average of historical heating degree (HDD) at Columbia and Cape Girardeau weather stations. Mr. Ryterski's testimony calculated the average HDD weighted by customer usage at these two locations. It appears that Mr. Ryterski's weighted HDD is slightly higher than the simple

[11] ibid., at Page 8, P 17.

average. This indicates that our peak-day HDD estimate may not be as high as Mr. Ryterski utilized in his testimony.



Source: Table 3, Ryan Ryterski direct testimony, page 19.



Source: Energy Velocity Daily Weather Data (Cape Girardeau Airport, Columbia Regional Airport, Kansas City International Airport Weather Station Data)

2. Calculate average usage for Residential and General Service customers during a peak winter month utilizing the coefficients estimated by Mr. Ryterski. The highest HDDs from 2011 through 2020 occurred in January 2014, with 1174.5 HDDs that result in 12.2 Mcf average monthly usage for Residential customers and 47.7 Mcf for General Service customers using the regression coefficients estimated by Mr. Ryterski.

Rate Code	R^2	1st Coefficient	1st Coefficient P-Value	2nd Coefficient	2nd Coefficient P-Value
Residential	0.98905	0.0688	8.88E-16	0.0420	2.76E-06
General Service	0.98896	0.1781	4.96E-09	0.2744	8.38E-13
Standard Transport	0.92296	3.4979	2.53E-51	N/A	N/A
Large Volume Transport	0.55873	56.3257	1.73E-17	N/A	N/A
Interruptible	0.36113	13.1048	2.40E-10	N/A	N/A

Source: Table 4, Ryan Ryterski direct testimony, page 20.

3. Derive the total peak month residential and commercial customer demand by multiplying the average customer usage with the number of residential and commercial customer accounts[12] in 2019 EIA 176 data.
4. Calculate peak-day demand for these two customer classes by multiplying the total peak month demand, estimated from step 3 above by 5.6%, the ratio of the 30-year peak-day HDD, occurred on January 6, 2014 the monthly HDD in January 2014.

Table 2-1 Estimated Peak-Day Gas Demand for Ameren Missouri

	Residential	General Service (Commercial)	Total Firm Customers
Average Monthly Usage per Customer (Mcf)	12.2	47.7	
Peak-Month Demand (Mcf)	1,444,856	618,459	2,063,315
Peak-Day Demand (Mcf/day)	81,192	34,754	115,946

The approximately 116,000 Mcf/day of peak-day demand estimated above is a conservative proxy for the peak-day demand for Ameren Missouri, as our constructed HDD is not as high as Mr. Ryterski presented in his study and the actual customer accounts could be higher than reflected in the EIA 176 data. This peak-day need excludes industrial, commercial, and electric utility consumers behind the Ameren Missouri city-gate that procures upstream transportation or relies on marketers to deliver gas supplies to the city-gate.

This report focuses on the counties in the Ameren Illinois service territory that can be served by MRT East, which represents a small portion of Ameren Illinois' peak-day demand. To simplify the discussion, we assume that the peak-day Ameren Illinois demand is the same as the firm

[12] Commercial customer accounts were used to approximate general service customer accounts. The 2018 total deliveries to commercial customers are similar to total general service customer throughput data presented in the rate case.

transportation capacity on MRT East held by Ameren Illinois. Similarly, this peak-day need excludes industrial, commercial, and electric utility consumers behind the Ameren Illinois city-gate that procures upstream transportation or relies on marketers to deliver gas supplies to the city-gate.

Table 2-2 Firm Peak-Demand for the Regional Utilities

	Peak-Day Demand (Dth)
Spire Missouri	1,273,679
Ameren Missouri[13]	115,946
Ameren Illinois (MRT East)	80,000
Total	1,469,625

2.3 Gas Volumes Transported on Behalf of Others

As mentioned previously in this report, behind their city-gates, Spire Missouri and Ameren Missouri also deliver natural gas on behalf of others, offering only transportation services to consumers that select this approach to obtain gas supply from the interstate pipeline to their delivery point on their respective gas distribution systems. Often, these gas consumers will utilize a non-utility gas marketer that has existing capacity on the interstate pipeline network to acquire upstream gas supplies and nominate it to the city-gate. Some of these marketers rely upon released capacity from these same utilities, under contracts that allow the utilities to recall the released capacity to meet their own needs during peak-day winter conditions. If the utility recalls its released capacity, a gas customer or marketer will lose access to that capacity. Customers and marketers relying on recallable capacity will be subject to curtailment if the utility recalls its released capacity, and thus will lose the ability to deliver natural gas to the city-gate.

Based on Form EIA-176 data,[14] Spire Missouri transports on average approximately 129,000 Mcf/day on behalf of others to commercial, industrial, and electric utility customers on its system. Spire Missouri does not hold firm transportation or storage capacity for these consumers and leaves it to each individual consumer arrange for gas supply and transportation to the city-gate. Some of these customers rely on gas marketers to deliver gas to Spire Missouri's city gate. For example, Symmetry uses MRT capacity to serve a combination of large and small commercial and industrial end-user customers, and includes primary and secondary schools, prisons, hospitals, critical infrastructure and industry users.[15]

[13]Ameren Missouri demand is estimated using the Black & Veatch estimate presented in Section 2.2.2.

[14] The Form EIA-176 is required from all identified interstate and intrastate natural gas pipeline companies, investor and municipally owned natural gas distributors, underground natural gas storage operators, synthetic natural gas plant operators, and field, well, or processing plant operators that deliver natural gas directly to consumers (including their own industrial facilities) and/or that transport gas to, across, or from a state border through field or gathering facilities.

[15] August 23, 2021 comments in Docket No. CP17-40-007

Most of these customers do not have alternate fuel capabilities and could be curtailed if upstream MRT capacity is not available or recalled by the utility. As shown below Figure 2-6, over the 2015–2019-time frame, the average transportation for others was 123,904 Mcf/day.

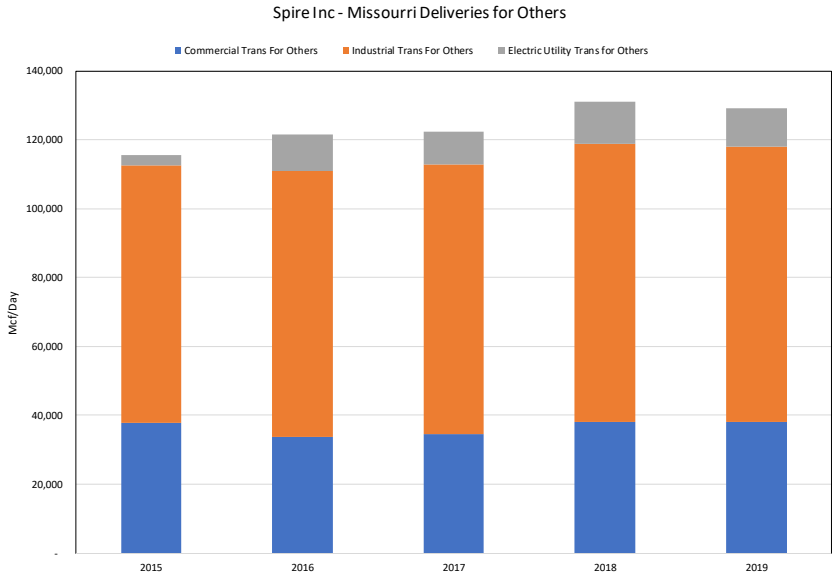


Figure 2-6 – Historical Industrial and Commercial Gas Load and Customers served by Spire

Source: Form EIA 176 Data

Similarly, for Ameren Missouri, approximately 24,758 Mcf/day are transported on behalf of others from their interstate city-gates to consumers on their distribution system, as shown below in Figure 2-7.

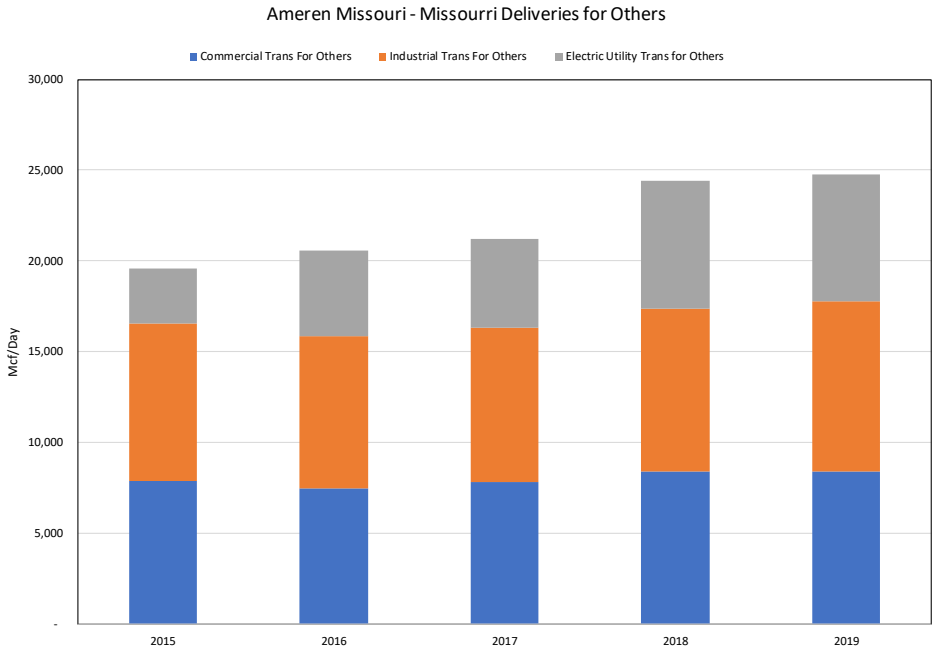


Figure 2-7 – Historical Industrial and Commercial Gas Load and Customers served by Ameren Missouri

Source: Form EIA 176 Data

3.0 Firm Gas Supply to Serve Regional Peak-Day Demand

To meet its firm customers' peak-day demand, Spire Missouri holds a portfolio of interstate transportation and storage deliverability. As shown below in Table 3-1, Spire Missouri is primarily reliant on MRT, STL Pipeline, and MoGas, with an additional 357,000 Dth/day of max withdrawal capability provided by Spire Missouri's Lange Storage facility to serve its peak-day demand. Without the STL Pipeline capacity, Spire Missouri will not be able to meet its projected winter peak-day demand of approximately 1.3 Bcf/day.

Table 3-1 Spire Missouri Gas Pipeline and Storage Portfolio to City-Gate

Current Pipeline and Storage Portfolio	Dth/Day
Enable MRT	550,779
MoGas Pipeline	145,600
Southern Star Central	30,300
Spire STL Pipeline	190,000[16]
Spire Missouri Underground Storage (Lange)[17]	357,000
Total	1,273,679

Tables 3-2 and 3-3 show the firm capacity contracts of Ameren Missouri and Ameren Illinois hold to serve their respective firm customer peak-day demand.

Table 3-2 Ameren Missouri Gas Pipeline Portfolio to City-Gate

Current Pipeline Portfolio	Dth/Day
Mogas Pipeline	24,837
Panhandle Eastern Pipeline	130,000
Southern Star Central	4,400
Total	159,237

[16] Spire Missouri holds 350,000 Dth/day of capacity on STL Pipeline, however, only 190,000 Dth/day of capacity is relied upon for gas supply directly to Spire Missouri's city-gate. The remaining 160,000 Dth/d of supply relies upon MRT and MoGas capacity to reach the Spire Missouri city-gate.

[17] Black & Veatch assumes that there is sufficient Lange Storage inventory to support this level of deliverability.

Table 3-3 Ameren Illinois Gas Pipeline Portfolio to Greater St Louis City-Gate

Current Gas Pipeline Portfolio	Dth/Day
Enable MRT	80,000
Total	80,000

Tables 3-4 shows the firm capacity contracts with the greater St. Louis delivery rights held by non-utility on various interstate pipelines. As indicated previously, this capacity is the only firm capacity to serve the transportation-only customers behind the utilities' city-gates during peak-day demand conditions when the utilities are utilizing their entire supply portfolios.

Table 3-4 Pipeline Capacity to the Greater St Louis City-Gates Not Held by Ameren Missouri or Spire Missouri[18]

Current Pipeline Portfolio	Dth/Day
Enable MRT	17,112
MoGas	575
Panhandle	60
Total	17,747

4.0 Potential Peak-Day Supply Gap

4.1 Peak-Day Demand and Supply in the Greater St. Louis Market

Table 4-1 shows the estimated total peak-day demand in the greater St. Louis market that includes the three utilities' peak-day demand for their firm customers, primarily residential and commercial customers and their transportation-only customers.

Spire Missouri and Ameren Missouri provide, on average, 153,781 Mcf/day of gas transportation services to commercial, industrial, and electric utility natural gas customers. Some of these customers hold firm transportation contracts upstream of the Spire Missouri and Ameren Missouri city-gates, and others rely upon the firm gas supply contracts held by natural gas marketers or recallable released capacity by Spire Missouri and Ameren Missouri.

[18] Capacity on MRT Held by CenterPoint Energy Services Inc, Gujarat Glass International Inc, and Laclede Energy Resources. Capacity on MoGas is held by Omega Pipeline Co, and Capacity on Panhandle is held by Bluemark Energy LLC.

Table 4-1 Total Peak-Day Demand in the Greater St. Louis Market

	Peak-Day Demand (Dth)
Spire Missouri	1,273,679
Ameren Missouri	115,946
Ameren Illinois (MRT East)	80,000
Utility Transportation-only Customer Demand[19]	153,781
Total	1,623,406

Table 4-2 shows the firm supply sources all customers in the greater St. Louis market can rely upon during peak-day demand period with and without the STL Pipeline. As shown in the table below, without the STL Pipeline, Spire Missouri will lose 350,000 Dth/day of firm transportation capacity on the STL Pipeline which will result in a reduction of 190,000 Dth/day of firm delivery capacity to the city-gate for meeting its firm customers' needs. In addition, Spire Missouri's firm capacity on MoGas will be reduced to pre-STL levels of 62,800[20], which means a reduction of 82,800 Dth/day firm capacity on MoGas.

Table 4-2 Firm Supply Sources to Meet All Customers' Peak-Day Demand in Greater St. Louis Market

	Firm Supply Sources with STL Pipeline	Firm Supply Sources without STL Pipeline
Spire Missouri	1,273,679	1,000,879[21]
Ameren Missouri	159,237	159,237
Ameren Illinois	80,000	80,000
Firm Capacity Accessible to Non-Utility Customers	177,747[22]	17,747[23]

[19] Annual average delivery volumes for 2019.

[20] Application of Spire STL Pipeline LLC for a Temporary Emergency Certificate, or, in the Alternative, Limited-Term Certificate, FERC Docket No. CP17-40-007, (Jul. 25, 2021), Ex. Z-1, Affidavit of Scott Carter, President of Spire Missouri Inc, at Page 7, Table 1.

[21] Without the STL Pipeline, Black & Veatch subtracted 190,000 Dth/day from Firm Supply from Spire Missouri's gas supply portfolio as 190,000 Dth/day represents deliveries to the city-gates and the additional 160,000 Dth/day firm capacity is used to provide upstream supplies on MoGas and MRT. Spire Missouri's firm capacity on MoGas will be reduced by 82,800 Dth/day without the STL Pipeline. Black & Veatch assumes here that firm capacity upstream on MRT is available to meet Spire Missouri's total contract volume is available. This assumption underestimates the reduction to Spire Missouri's firm capacity portfolio without the STL Pipeline if there is no sufficient upstream firm capacity to meet Spire Missouri's full MRT capacity volume.

[22] Total firm capacity includes 17,112 Dth/day on MRT, 575 Dth/day on MoGas, 60 Dth/day Panhandle currently held by non-utility customers and the 160,000 Dth/day Spire Missouri capacity on the STL Pipeline to support deliveries on MoGas and MRT.

[23] Total firm capacity only includes 17,112 Dth/day on MRT, 575 Dth/day on MoGas, 60 Dth/day Panhandle currently held by non-utility customers.

Available MoGas & MRT Capacity[24]	10,568	10,568
Total	1,701,231	1,268,431

4.2 Potential Impact to Spire Missouri and Commercial, Industrial, and Electric Utility Transport-Only Customers

Without the STL Pipeline, Spire Missouri will lose 350,000 Dth/day of firm transportation capacity on the STL Pipeline which will result in a reduction of 272,800 Dth/day of firm delivery capacity to the city-gate for meeting its firm customers' needs, including 190,000 Dth/day direct delivery to city-gates and upstream support to 82,800 incremental MoGas deliverability. This is assuming that the Lange storage facility has sufficient inventory level to support the 357,000 Dth/day deliverability. If the actual storage inventory level is lower, Spire Missouri may have a supply shortfall greater than 272,800 Dth/day.

Under winter peak-day conditions, Spire Missouri and Ameren Missouri must recall their released transportation capacity to meet their own firm customers' gas needs. Spire Missouri and Ameren Missouri's recall of their released capacity will create a gas supply shortfall for commercial, industrial, and electric utility consumers that rely on recallable gas transportation. It is likely that these consumers will be curtailed.

If the STL Pipeline is not in operation, the potential firm supply gap to Spire Missouri customers and gas customers behind Spire Missouri and Ameren Missouri city-gates could lead to significant gas supply curtailment to primary and secondary schools, hospitals, prisons, critical infrastructure, and industrial users. These customers may not have alternative fuels to turn to when gas is curtailed and would incur financial harm. As shown below in Table 4-3, without the STL Pipeline, both Spire Missouri gas customers and those behind Spire Missouri and Ameren Missouri city-gates would need to seek alternative fuel supplies to meet their peak-day needs.

Table 4-3 Potential Supply Gap on a Peak-Day without STL Pipeline

	Dth/day
Spire Missouri	272,800
Transportation-only Customers behind Utility City-gates	Up to 82,175

4.3 Potential Impact from the Early Retirement of Ameren's Rush Island Generation Facility

In August 2021, a federal appeals court upheld a 2019 ruling that ordered Ameren Missouri to install pollution controls at its Rush Island generation facility, which could add incremental costs to

[24] Spire can acquire additional 10,000 Dth/day from MoGas, 568 Dth/day from MRT, according to Affidavit of Scott Carter, President of Spire Missouri Inc.

retrofit the coal plant.[25] This court ruling could change Ameren Missouri's plan, as stated in its 2020 IRP, to keep Rush Island open until 2039.[26] Early retirement of Rush Island would require Ameren to develop replacement generation resources that could include renewables and natural gas-fired generation, or increase utilization of existing natural gas facilities in the region.

Black & Veatch utilized the historical hourly generation from the EPA CEMS data on the Rush Island facility from 2018 through 2021. Our analysis estimated how much natural gas would have been needed to generate the same amount of electricity from gas-fired generation on average during the same time historical period, assuming 7630[27] Btu/kWh to represent a typical generator in Missouri. Under these conditions, the potential natural gas needed for generation could reach up to 157,178 MMBtu on average, as shown below Figure 4-1,

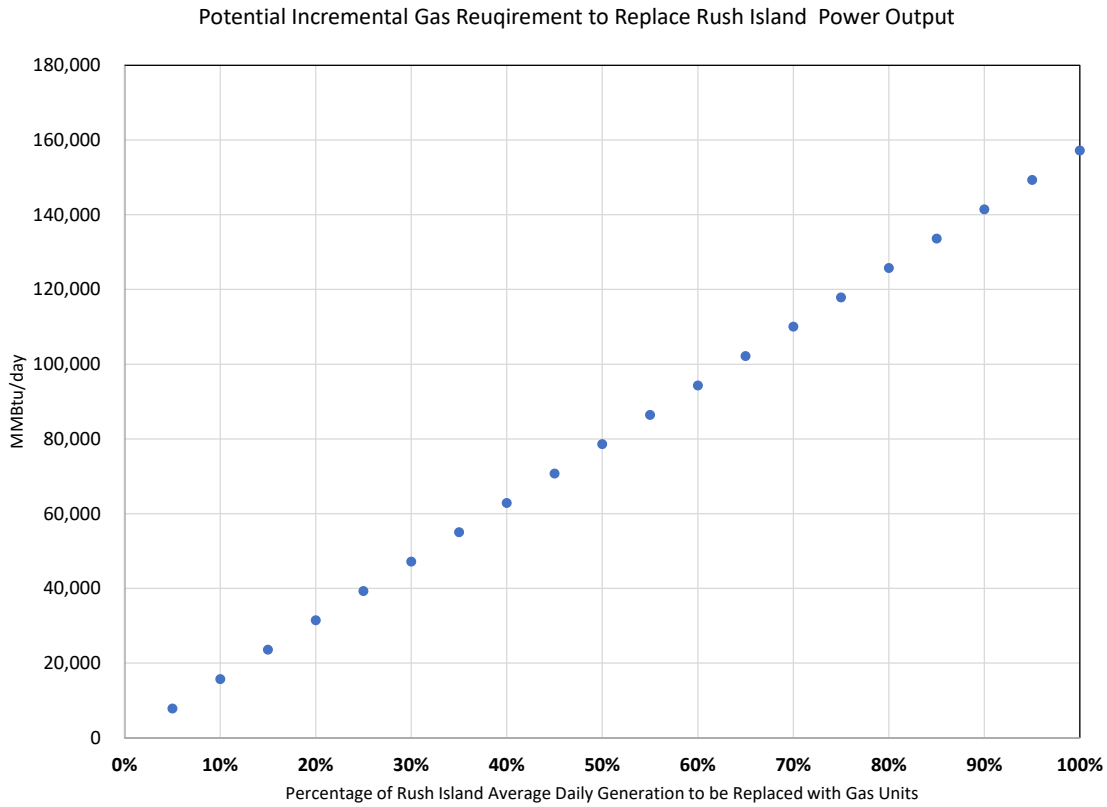


Figure 4-1 – Potential Incremental Regional Gas Needs to Replace Rush Island Generation

If Ameren Missouri decides to replace the Rush Island generation with gas-fired generation in the greater St. Louis market, this could widen the potential supply gap by up to 157,178 MMBtu/day. Figure 4-2 below shows, as an example, that without the STL Pipeline, the supply gap between

[25] https://www.stltoday.com/news/local/state-and-regional/u-s-court-of-appeals-ameren-must-install-scrubbers-at-jefferson-county-coal-plant/article_4209c272-4bef-56c6-a27c-08b6ad7a8ccc.html
[26] Ameren 2020 IRP Executive Summary Page 4
[27] https://evcvaluation.com/declining-natural-gas-fired-heat-rates/

winter peak-day demand and the available firm supply sources widens, assuming 50% of the coal generation at Rush Island is replaced by natural gas to serve the greater St. Louis market.

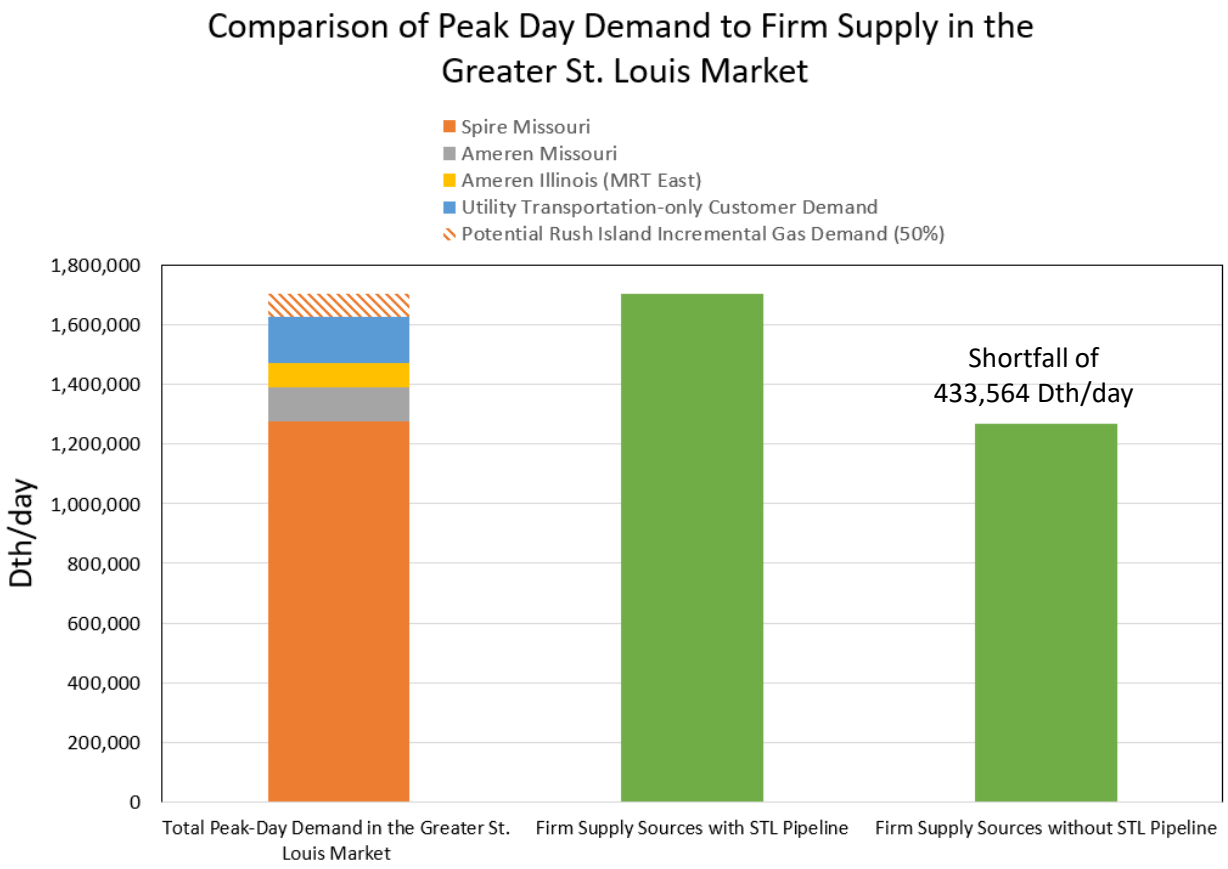


Figure 4-2 – Comparison of Winter Peak-Day Demand to Firm Supply in the Greater St. Louis Market