Rye Development

100 S. Olive Street, West Palm Beach, FL 33401

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

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PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC JOINT APPLICATION OF KENTUCKY UTILITIES COMPANY AND LOUISVILLE GAS AND ELECTRIC COMPANY FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY AND SITE COMPATIBILITY CERTIFICATES AND APPROVAL OF DEMAND SIDE MANAGEMENT PLAN	)	CASE NO. 2022-00402

RYE DEVELOPMENT

WRITTEN COMMENTS

Rye Development, LLC ("Rye" or "Rye Development"), a subsidiary of FFP New Hydro, LLC, submits its public comments ("Comments") for the Kentucky Public Service Commission's ("PSC" or "Commission") investigation into Case No. 2022-00402, *Electronic Joint Application of Kentucky Utilities Company and Louisville Gas and Electric Company for Certificates of Public Convenience and Necessity and Site Compatibility Certificates and Approval of a Demand Side Management Plan*. Rye respectfully requests that the Commission, Joint Applicants, and parties consider these Comments during the presentation of issues and development of facts regarding the matters in this docket.

I. SUMMARY OF COMMENTS

Rye respectfully requests the Commission deny granting all of the Kentucky Utilities Company and Louisville Gas and Electric Company (together, "LG&E/KU" or the

"Companies") Joint Application for, among other things, Certificates of Public Convenience and Necessity ("CPCN"), for two (2) gas plants, two (2) solar facilities, a battery facility, and a declaratory order regarding four (4) solar power-purchase agreements ("PPAs"). The Companies have the burden of proof, and they fail to provide sufficient evidence supportive of a least-cost solution.

The relief sought should not be considered by the Commission until a more accurate comparison of storage technologies is performed by the Companies and presented to this Commission. In lieu of granting the requested CPCNs, Rye requests that the Commission deny the Joint Application and direct the Companies to fairly consider Rye's pumped storage project located in the Companies' service territory—the Lewis Ridge Project, which will provide the Companies with reliable, long-duration storage at the least-cost to customers, under a long-term power purchase agreement, partial or full ownership option, or some combination thereof.

Rye specifically requests that: (1) the Commission deny any approval of Companies' requested CPCNs until further, accurate analysis has been completed on Rye's Lewis Ridge Project; and (2) the Commission direct the Companies to evaluate pumped storage resources more accurately by: (a) attributing these resources a capacity contribution figure in the range of 90-100 percent; (b) properly evaluating the significant diversity and operational benefits pumped storage resources provide; (c) fairly considering storage resources by assigning batteries a more accurate cost associated with their unproven use, faster-than-expected degradation, and market factors for raw materials, including supply chain risks; and (d) accounting for the tax credits for which Rye's pumped storage project will likely qualify.

II. INTRODUCTION TO RYE DEVELOPMENT AND ITS LEWIS RIDGE PROJECT

Rye Development was founded with a mission—to develop and commercialize both run-of-river and pumped storage hydro[1] projects that produce clean, renewable, and 24/7 energy. Since its founding, Rye has successfully secured 23 FERC licenses to develop its run-of-river and pumped storage hydro projects. Rye Development is the leading developer of closed-loop pumped storage hydro, bringing long-duration, grid-scale storage to the electricity grid.

Rye is developing a pumped storage hydropower project (the Lewis Ridge Project, or "Project") near Pineville, Kentucky. The Project will have a Nameplate Capacity of 287 MW. The Lewis Ridge Project was submitted to the Companies in response to their 2022 RFP. Rye's Project includes, among other things, an upper reservoir with a surface area of 24 acres and a storage capacity of 2,300 acre-feet; a 420-foot-long, 80-foot-wide powerhouse containing two 143.5-megawatt (MW) reversible pump-turbines with a total installed capacity of 287 MW; a 47 acre lower reservoir with a storage capacity of 2,300 acre-feet; and a 2.3-mile-long, 161 kilovolt overhead transmission line. The Project would have an estimated annual storage capacity of 671,700 megawatt-hours (MWh). The Project would have a storage time of 8 hours at full discharge capacity.

[1] Pumped storage hydropower (PSH) is a type of hydroelectric energy storage. It is a configuration of two water reservoirs at different elevations that can generate power as water moves down from one to the other (discharge), passing through a turbine. The system also requires power as it pumps water back into the upper reservoir (recharge). PSH acts similarly to a giant battery, because it can store power and then release it when needed. *See* United States Department of Energy, Office of Energy Efficiency & Renewable Energy, Water Power Technologies Office. https://www.energy.gov/eere/water/pumped-storage-hydropower (accessed Apr. 6. 2023). (The Department of Energy's "Pumped Storage Hydropower video explains how pumped storage works.)

III. THE LEWIS RIDGE PROPOSAL IS AN ULTRA-FLEXIBLE SOLUTION COMPLETELY CONSISTENT WITH THE COMPANIES' STATED OBJECTIVES, DESPITE THE PROJECT NOT BEING FAIRLY OR ACCURATELY CONSIDERED BY THE COMPANIES.

The Lewis Ridge Project is an ultra-flexible resource. It is ideal for cost-effective firm peaking, firm dispatchable baseload and/or load-following capacity. The Companies identify asset ownership as an approach for mitigating solar execution risk.[2] An advantage of the Lewis Ridge Project is that Rye is willing to consider flexible offtake or ownership options, thereby providing LG&E/KU the flexibility of a rate base addition to the Companies' portfolio or as a Merchant Plant resource. The Companies state that they propose "a set of demand- and supply-side resources that are reliable and lowest cost on the whole across a broad range of possible future conditions (emphasis in original)."[3]

Nevertheless, despite these various statements by the Companies that seem to suggest the Lewis Ridge Project is ideally-suited to meeting the needs the Companies have identified, the flexibility of the Lewis Ridge solution does not appear to have been fully or accurately considered and valued in the Companies' process, thereby making their claim of lowest cost "on the whole" specious, at best.

Moreover, the Lewis Ridge Project provides the diversity in generation source, hedge against fuel costs and fuel price volatility, and positioning for compliance with clean energy and/or carbon reduction regulations that the Companies indicate that they seek. The Companies, throughout their responses to various requests for information, discuss the need for assets that can function for decades. In view of the Companies own portfolio,

[2] *See* Response to Staff's First Request for Information (Mar. 10, 2023), Item 64 ("Response Staff, 1-__").

[3] Response Staff, 1-29.

which includes hydro generation assets that have been operating for approximately a century, the durability of the Lewis Ridge Project matches up with the Companies' real world operational experience for hydro assets.

IV. THE COMPANIES' ANALYSIS OF PUMPED STORAGE IS INACCURATE AND UNFAIRLY PENALIZES PUMPED STORAGE RESOURCES, TO THE DETRIMENT OF THEIR RATEPAYERS

Rye submits to the Commission that the Companies' analysis is flawed, resulting in an unfair evaluation of pumped storage resources, quite likely to the detriment of Kentucky ratepayers. The remainder of these Comments explain how:

> (1) the Lewis Ridge Project provides unique benefits to the Companies, particularly in the form of an incredibly-high capacity contribution, which has not been accurately evaluated;
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> (2) pumped storage provides a portfolio-optimizing effect that has not been captured in the Companies' analysis;
>
> (3) pumped storage provides unmatched reliability benefits, including with respect to fuel availability and ability to withstand extreme weather events, which have also not been captured by the Companies' analysis;
>
> (4) pumped storage provides unique diversity to the Companies' resource mix and long-duration storage that no other resource under consideration by the Companies can provide; and
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> (5) pumped storage clearly aligns with the Commonwealth's interest in transitioning coal mines to a clean energy future, and therefore, is in the public interest.

a. THE LEWIS RIDGE PROJECT OFFERS UNIQUE BENEFITS TO THE COMPANIES.

Unlike the Companies' existing hydro fleet, the Lewis Ridge Project provides unique benefits to the Companies and their ratepayers. The Companies' existing mix of

hydro facilities consists of two run-of-the-river facilities: (1) the Dix Dam, and (2) the Ohio Falls facility. Dix Dam is a 31.5 MW facility with no storage capacity to speak of, and Ohio Falls is a 40 MW facility during the Winter and 64 MW facility during the Summer, again with no measurable storage capacity.[4] Given the lack of storage capacity at the Companies' existing hydro facilities, the Companies assign these facilities a very low capacity factor—namely, the capacity factor for the Dix Dam facility for the period of 2024 through 2036 is 32 percent, and the capacity factor for the Ohio Falls facility for the same period ranges from 31 percent to 33 percent.[5]

As an aside, Rye suggests that the Companies information concerning its own hydrogeneration capacity factors warrants further review. In response to a request by the Kentucky Attorney General for the capacity factors for the Companies' existing generation fleet, the net capacity factors for hydro ranged from a low of 13.8 percent in February of 2022 to a high of 37.8 percent in February 2021.[6] Comparatively, in response to a request by the Mercer County Fiscal Court, the Companies provided average net capacity amounts for 2018 through 2022 with 40.48 percent as the lowest amount for hydro.[7] While these low capacity factors might be appropriate for the Companies' existing, run-of-river

[4] KY PSC Case No. 2021-00393, *Electronic 2021 Joint Integrated Resource Plan of Louisville Gas and Electric Company and Kentucky Utilities Company*, (filed Oct. 19, 2021), Volume I, Table 8-3, page 8-12 [PDF 87 of 118].

[5] *Id.*, Table 8-4, page 8-13 [PDF 88 of 118].

[6] Response to Attorney General's Initial Request for Information (Mar. 10, 2023), Item 18 ("Response AG 1-__") (December 2021 through March 2022 and December 2020 through March 2021).

[7] Response to Mercer County Fiscal Court's Initial Request for Information (Mar. 10, 2023), Item 4 ("Response Mercer 1-__").

hydro projects, they are not appropriate for performing an accurate comparison to the Lewis Ridge Project. Nevertheless, despite the significant difference in the storage capability and operational realities of the Companies' existing hydro projects and the Lewis Ridge Project, the Companies appear to improperly score the Rye Development Project by reference to facilities in the Companies' portfolio that have a ***significantly*** lower capacity factor due to being entirely dependent on day-to-day water conditions on the river.

Unlike the Companies' run-of-river facilities, the Lewis Ridge Project has significant storage capability. For example, the 287 MW Nameplate Capacity of the Rye Project is approximately three (3) times the combined Net Capacity of the Dix Dam and Ohio Falls facilities. When this significant nameplate capacity is coupled with over 8 hours of storage capability, the Lewis Ridge Project becomes a massive, reliable, renewable battery, which can be dispatched on-demand and used to integrate numerous other types of resources into the Companies' service territories.

Based on some of the unique features of the Lewis Ridge Project described above, the capacity contribution of pumped storage projects like Lewis Ridge are unlike any of LG&E/KU's existing hydro resources. For example, based on Rye's experience throughout the United States, most utilities assign PSH projects like the Lewis Ridge Project a capacity factor in the range of 89-100 percent in their respective IRPs. Thus, use of a sub-40 capacity contribution figure for pumped storage hydro power is far too low and does not align with common practice throughout the United States for these reliable, flexible capacity resources.

In an effort to better understand LG&E/KU's evaluation of the Lewis Ridge Project as compared to the resources proposed in this proceeding, particularly including the Companies' low capacity figures for pumped storage, Rye raises the following issues for consideration to ensure that all of the unique benefits associated with pumped storage hydro are accurately reflected in LG&E/KU's analysis. Rye is furthermore interested in seeing LG&E/KU's analysis of how pumped storage hydro compares to batteries along different saturation curves, and it is important that LG&E/KU's analysis is subjected to adversarial testing and a thorough review by the Commission.

b. PUMPED STORAGE HYDRO IS RENEWABLE ENERGY THAT CAN PROVIDE SYSTEM-WIDE BENEFITS TO LG&E AND KU AND FACILITATE THE COMPANIES' INTEGRATION OF ALL TYPES OF RESOURCES.

Pumped storage resources provide significant, system-wide benefits to utilities, particularly those seeking to integrate large amounts of variable or intermittent resources. As various states throughout the Country evolve their energy generation portfolios and look to integrate more renewable energy into the electricity system, utilities will need ***significant*** storage capability and system operating flexibility to reliably integrate the scale of renewable resources being contemplated by these policy objectives. As compared to any other resource currently under consideration by LG&E/KU, pumped storage resources are best suited to serve these purposes, given their capacity to absorb significant energy from variable or intermittent resources over long durations, and ability to provide the services necessary to maintain a reliable electrical system.

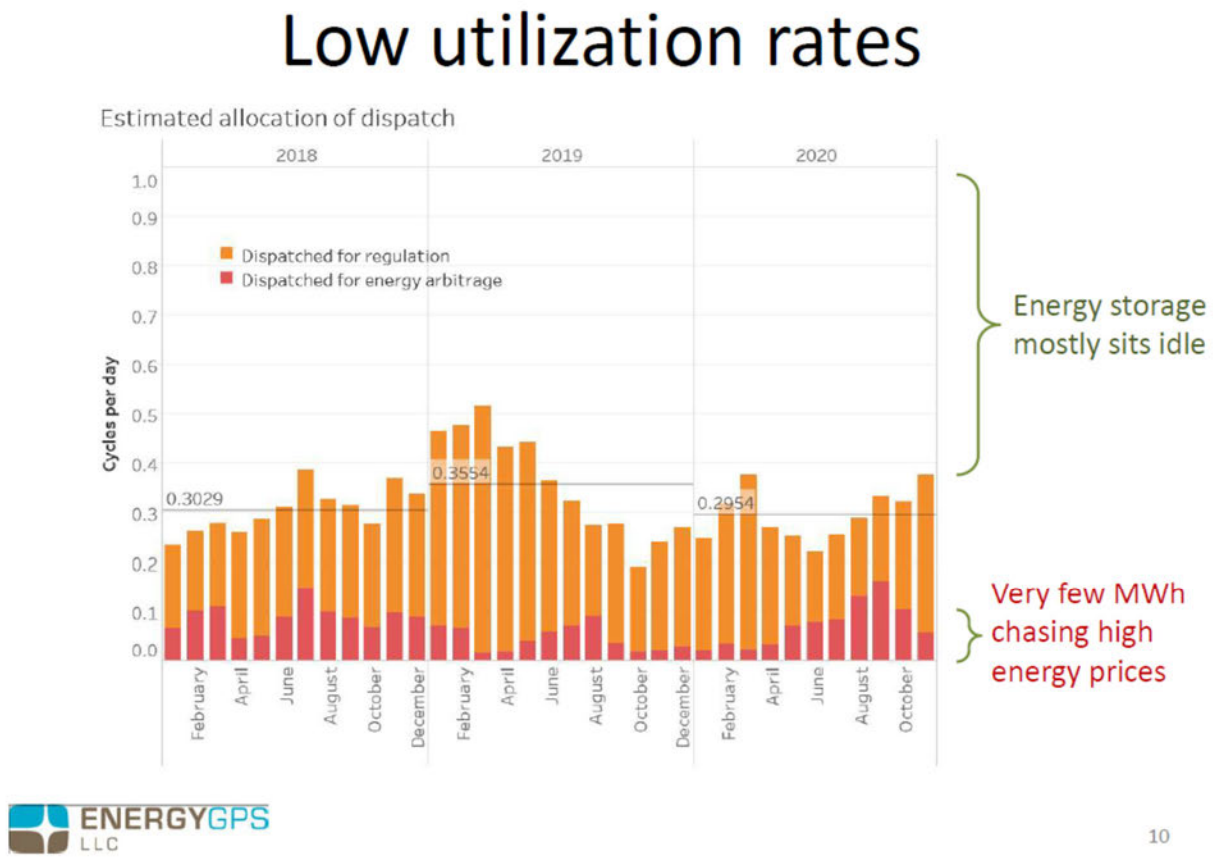
A significant benefit of pumped storage is that it is uniquely well-suited to reduce the risk that LG&E/KU will be short on capacity in the near future. Given pumped storage resources' ability to better integrate all types of resources, the addition of pumped storage

hydro will have a portfolio maximizing and optimizing effect, meaning it will allow utilities to maximize the efficiency of their acquired or owned resources by optimizing output, thereby ensuring they are getting the greatest capacity contribution possible from any resources LG&E/KU owns or purchases. Thus, pumped storage resources also provide a significant benefit to ratepayers by ensuring utilities maximize the benefits of their investment in generation resources, particularly those that are not dispatchable and have intermittent generation profiles. PPL Corporation is the parent company of the Companies, and these capabilities and attributes of pumped storage are entirely consistent with PPL Corp's Net Zero Carbon strategy.[8]

Weighed against other energy storage options, pumped storage is best-suited to meet LG&E/KU capacity needs because other storage technologies are largely unproven, or ill-suited for this purpose. What evidence that does exist for grid-scale batteries suggests these resources are largely dispatched for regulation services (*i.e.*, ancillary services) rather than to provide energy or capacity. For example, a recent Energy GPS presentation included the following table looking at how batteries in California are being

[8] *See* Our Path to Net-Zero, available at: https://www.pplweb.com/sustainability/environment/climate-action/#:~:text=Our%20path%20to%20Net%2DZero,to%20achieve%20our%20interim%20targets.

utilized, which supports the conclusion that these resources should not be relied upon for capacity.[9]



c. Pumped Storage Hydro Has Capacity and Reliability Attributes That Can Even Out the Companies' Generation and Transmission.

Unlike any other type of resource LG&E/KU is considering building through its applications for CPCN permits in this proceeding, pumped storage facilities are renewable storage resources that are also responsive to demand and can quickly dispatch to serve several hours of critical peak periods. Assuming that the highest priority of pumped

[9] Energy GPS, "The Next Technology – Batteries," Webinar, December 17, 2020, webinar link: https://go.energygps.com/l/852553/2020-12-09/285kkv.

storage is reliability, then LG&E/KU should be interested in charging the pumped storage hydro during off peak hours to ensure there is enough water in the reservoir to address multi-hour capacity need periods.

Operationally, peak load days are fairly predictable, meaning that LG&E/KU's operations employees could set up for those days in advance to ensure pumped storage facilities have sufficient pond fills to cover the expected peak load hours. Furthermore, the pumped storage hydro facility would not necessarily need to deplete its full reservoir daily to address capacity needs (low frequency of 8-hour reliability events), reducing the total amount of charging required to address all potential loss of load events.

Given these operational realities, LG&E/KU's use of an artificially low capacity contribution value for pumped storage hydro is unwarranted. Using such low capacity values implies that the facility is energy limited and does not have access to the market or other on-system resources to charge for peak load events. Rye openly questions whether that is a valid assumption for a resource that is ideally situated to take advantage of numerous sources of charging energy.

Rye also suggests that LG&E/KU's analysis underestimates the risk of a particular variable resource not being available when needed for reliability, compared to a resource like pumped storage. LG&E/KU's modeling should consider extended cold snaps, or other highly correlative weather events, where pumped storage hydro is likely to outperform

other technologies.[10] This is an important aspect of resource diversity and one for which the Companies have provided insufficient explanation or analysis.

In any resource adequacy discussion or planning process, large, grid-scale storage devices like pumped storage should be considered primarily as capacity resources and the modeling should reflect this attribute. In real operations, storage devices like a pumped storage project would not be operated on purely economic arbitrage signals, and instead would be made available for capacity service if the utility is forecasting potential loss of load hours. This operational reality means charging the storage device during the hours leading up to a loss of load event, even if market prices do not signal an economic opportunity. Thus, accurate modeling for large storage resources like pumped storage requires taking into account the operational realities of these resources, in addition to the actual ability to contribute capacity.

Large storage facilities like pumped storage can charge and discharge during different hours of the day and hold charge for several days (if necessary) to meet capacity needs. When the modeled time window is not long enough in to describe the full pumped storage cycle (*i.e.*, the time window is limited to, for example, 24 hours), the model shows storage forced to arbitrarily discharge and charge daily. This artificially limits the modeled capability of pumped storage to hold more charge for sustained periods of capacity need in the future and limits the charging time windows allowed to meet full charge. Thus, any model should optimize over a longer time period (at least a week) in order to give storage

[10] In view of the performance of the Companies' coal and natural gas facilities during the December 2022 Winter Weather Event, assumptions concerning the reliability and performance assumptions for the fossil fuel units should also be revisited.

resources the optionality for charging, discharging, and holding charge at periods that more accurately reflect their real-world operational capabilities.

Recent reliability incidents in Kentucky, Texas, and California dramatically illustrate that extreme weather events are occurring much more frequently than has historically been the case, which is affecting the entire electric utility industry. These recent, extreme weather events point to a need for the utilities to increase their near-term acquisition of additional capacity resources, especially long duration capacity resources like pumped storage, to handle these more frequent, extreme weather events and simultaneously manage the increased planning and operational uncertainty that comes with greater penetration of intermittent renewable resources on their systems.

The latter dynamic was most vividly demonstrated during the August 2020 California outages where the California Independent System Operator ("CAISO") needed to manage its early evening load, not to the traditional gross peak, but to the much less predictable net peak created by its high penetration of solar resources. Such problems can only be avoided if the Commission acts to ensure utilities like LG&E/KU are acquiring sufficient raw capacity and operational flexibility to meet their future needs while maintaining system reliability. Further, the acquisitions cannot be made separate from the current and likely environmental regulations that favorably distinguish pumped storage from carbon fuel raw capacity options.

d. PUMPED STORAGE HYDRO PROMOTES A DIVERSIFICATION OF ENERGY MIX.

Studies have shown the capacity benefits from renewable resources decrease significantly as additional resources of the same generation type or profile are added to

utilities' systems (often referred to as "saturation").[11] For example, the figure below from a study by the National Renewable Energy Laboratory ("NREL") demonstrates that, absent a diversity of generation types, renewable resources' capacity contributions decrease rapidly, as additional wind and solar resources are added to the system.[12]

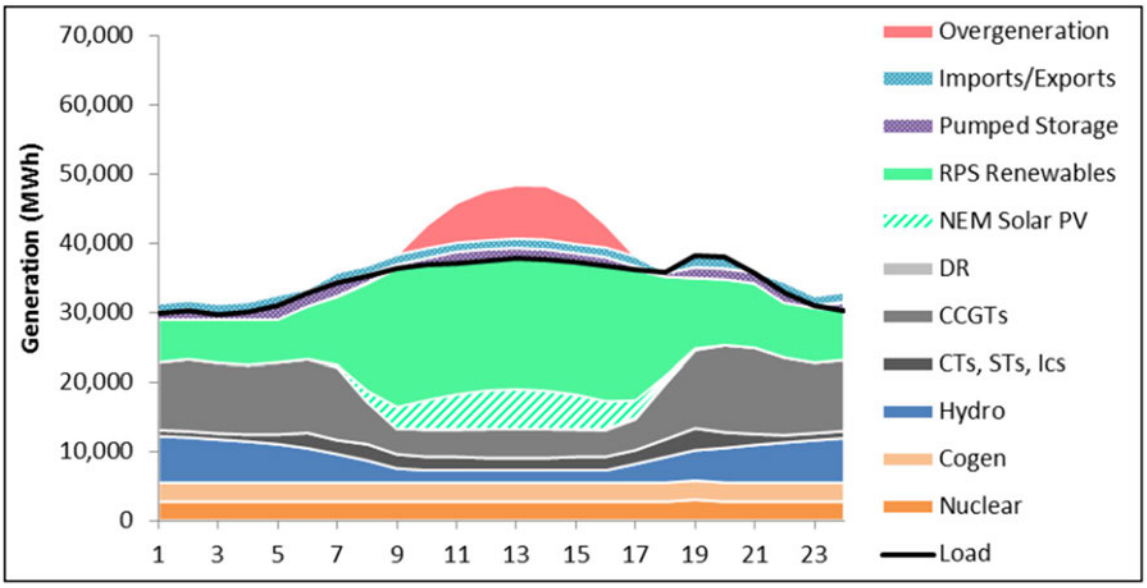


Figure 5. Example of an analysis of the impact of high VG on net load shape and resulting overgeneration

Source: E3 2014

The figure above clearly demonstrates that with too much renewable penetration on the electric grid, the value of these resources diminishes and additional curtailments are needed to manage oversupply.

To mitigate this problem of over-saturation and diminishing capacity contributions, and to therefore maximize the benefits to customers of significant investments in all its

[11] *E.g., Overgeneration from Solar Energy in California: A Field Guide to the Duck Chart*, National Renewable Energy Laboratory at page 9, Nov. 2015, available at: https://www.nrel.gov/docs/fy16osti/65023.pdf.

[12] *Id*. at Fig. 22 and 24, pages 55 and 57.

generation resources, particularly including renewable energy, LG&E/KU should further diversify its resource mix sooner. Pumped storage is uniquely positioned to provide the type of diversity LG&E/KU needs to maximize the benefits of its investments in renewable energy because resources like the Lewis Ridge Project are large, grid-scale, dispatchable, flexible, clean resources that can be operated in tandem with renewable energy and conventional generation resources to provide around-the-clock energy and capacity to a utility.

Similarly, diversity is necessary to reliably serve customers through extreme weather events, which recent events have shown are becoming more common, as described above. Again, pumped storage resources are uniquely well-positioned to operate reliably through these types of events given their long discharge durations, flexible and dispatchable capacity, and ability to operate through extreme temperatures and weather events, unlike many other resources, including both gas and coal resources. Furthermore, pumped storage resources do not suffer from the same fuel constraints and risks as some of the other capacity resources LG&E/KU intends to add.

An additional benefit LG&E/KU would realize from acquisition of pumped storage (in lieu of adding batteries) involves optimizing use of these resources' 8-12 hour discharge capability for raw capacity purposes. Such capability (in contrast to lithium-ion batteries' current four-hour discharge limitations) would better align with LG&E/KU's Winter-Peaking needs.

Therefore, because diversity of resources is necessary for LG&E/KU to ensure it is maximizing the value of its upcoming investments in generation resources, as well as to withstand the increasing number of extreme weather events and avoid fuel constraints

resulting in reliability events, Rye strongly recommends pumped storage procurement and consideration be advanced in a fair and comprehensive manner and replace one of the existing, proposed gas resources and/or battery acquisitions being proposed by the Companies in this proceeding.

e. A Comparison of the Benefits of Pumped Storage Hydro and Battery Storage Demonstrates that the Companies Over-Reliance On a Battery Storage Strategy, to the Exclusion of Pumped Storage, Does Not Optimize Their Resource Acquisition.

Rye suggests that over-reliance on batteries is misplaced, unfounded, and untested, and will unnecessarily expose LG&E/KU customers to higher-than-projected replacement costs and potential reliability concerns. As support for Rye's concerns about the over-reliance on batteries for capacity, attached to these comments is a series of three (3) research papers by Navigant Consulting highlighting some of the complications, challenges, and pitfalls of relying too heavily on batteries, including the significant environmental degradation impacts and hidden costs of those projects.

Of particular note, Rye highlights that a key issue with proposing acquisition of Li-ion batteries for raw capacity needs is their likely performance for this new application. As referenced above, a recent presentation by Energy GPS suggests that batteries are well-suited for meeting ancillary services needs, However, they are largely unable to provide significant energy or capacity to utilities and, therefore, should not be assumed to provide such capacity.

Additionally, there is virtually no data on Li-ion battery performance for utility scale applications. Battery installations of over 50 MW have run for no more than ~3 years in an operational grid/utility environment, meaning it is impossible to credibly judge whether

a four-hour discharge duration used for capacity purposes is a suitable use for batteries. To this end, the Companies' objective to gain experience with battery storage is at a significant expense to its ratepayers, namely ignoring deployment of a superior storage technology that is lower-cost, more reliable, and a proven technology.

Currently planned Li-ion battery installations, especially in California, should provide the necessary operational data regarding whether batteries are suitable for this capacity purpose, however, it will probably not be sufficiently robust to validate (or rebuke) currently advertised Li-ion performance metrics until the post-2025 timeframe. The need for more data is especially important since, in an operational utility environment, these large battery installations will be fully charging and discharging several times per day over a multi-month per year period.

Similar to a cell phone battery, the more it is used, the quicker its capacity degrades, meaning the currently-asserted and modeled assumptions regarding charge/discharge and useful life cannot be fully vetted until more information is available. Without existing evidence that supports the use of batteries for capacity applications, Rye believes that relying on batteries would over-expose LG&E/KU to significant replacement and upgrade costs more frequently than LG&E/KU likely assumes, thereby resulting in inflated battery acquisition and maintenance costs to the detriment of ratepayers.

Besides these potential capacity performance issues with batteries, LG&E/KU should examine the serious problems CAISO is now experiencing in integrating Li-ion batteries into its grid to prevent additional outages in Summer 2021. Specifically, CAISO has been struggling to interconnect batteries and operate them. More pointedly, CAISO has found it cannot depend on their output to assist in meeting the summer net demand

evening peaks, particularly when the sun sets. The battery owners want to retain the ability to provide high value/lucrative ancillary services throughout the day, in addition to supplying energy for the post-solar evening peak.

CAISO is concerned that allowing such marketing flexibility will result in an insufficient state of charge to provide the necessary evening peak capacity to meet load. This debate has been going on for over two years with no resolution in sight. While this is a unique operational problem that should eventually be worked out, it provides an excellent example of the complex issues associated with integrating such a new technology with highly uncertain performance characteristics into the grid. Most experts believe that any eventual solution will cost a lot more, and result in suboptimal performance, from what the California utilities and their regulators assumed when they initially acquired these resources.

LG&E/KU will undoubtedly face the same state of charge/reliability problems if it acquires significant amounts of batteries to meet its peak capacity needs. In contrast, pumped storage, given its longer discharge capability and inherent operational flexibility, will either avoid such problems entirely or greatly minimize their real-world cost and performance impacts inherent in batteries used to meet capacity needs. When accurately compared, the benefits of pumped storage far outweigh those attributed to battery storage, and LGE's and KU's current prioritization of battery storage based upon "gaining experience" with batteries is at the cost of a technology that is presently capable of providing the dispatchable, reliable, clean capacity LG&E/KU is seeking.

Another significant issue with over-relying on batteries is that it exposes LG&E/KU to significant supply chain risks associated with lithium. By way of example, the

International Energy Agency estimates that just growth in demand for lithium as a result of Electric Vehicle adoption could result in an increase in demand for lithium of over 40 times by 2030.[13] Similarly, as a result of this demand, prices for lithium are expected to rise over the next decade.[14] Because most of the elements needed to produce a lithium-ion battery are located abroad (including lithium, cobalt, nickel, etc.), tight supplies, increasing demand, and uncertain access to these crucial elements of batteries, LG&E/KU will be exposed to significant supply chain risks, given its intended reliance on batteries as a capacity resource. Instead, LG&E/KU should consider prioritizing pumped storage resources, which are not subject to these same market factors that are likely to negatively impact the value of battery storage assets in the future.

f. THE LEWIS RIDGE PROPOSAL IS IN THE PUBLIC INTEREST BECAUSE IT FURTHERS AN IMPORTANT PUBLIC POLICY GOAL OF THE COMMONWEALTH THROUGH THE DEVELOPMENT OF A COAL MINE SITE.

While Rye Development is still sorting through the tax adder details specific to "energy communities" in the recently passed Inflation Reduction Act ("IRA"), the legislation is explicit on coal communities/coal sites. It is reasonable to note that the Lewis Ridge Project quite likely qualifies for the 30 percent investment tax credit, plus the 10 percent energy community adder, and may also qualify for the 10 percent content adder.

[13] *Lithium Shortage May Stall Electric Car Revolution and Embed China's Lead: Report*, Forbes, Nov. 14, 2021, available at: https://www.forbes.com/sites/neilwinton/2021/11/14/lithium-shortage-may-stall-electric-car-revolution-and-embed-chinas-lead-report/?sh=175ae8e946ef.

[14] *Id*.

The likely tax incentives for this project make the economics extremely attractive,[15] and the location of the project on a former coal mine site places the project squarely within the public interest of the Commonwealth to diversify its energy resources. The Lewis Ridge Project is an economic development project centered around Kentucky's long history of coal mining,[16] and therefore advances the Commonwealth's public interest in transitioning these communities to a clean energy economy.

However, despite being clearly consistent with Kentucky's policy objectives and the Company's own, numerous statements about the need for large, dispatchable, non-emitting capacity resources, the cost comparisons put forth by the Company have not been demonstrated as reasonably developed and examined. Therefore, Rye respectfully requests that the Commission not approve the Companies' requested CPCNs until a more accurate, full evaluation of the Lewis Ridge Project has been completed.

[15] *See, for comparison*, Response to Lexington-Fayette Urban County Government's and Louisville/Jefferson County Metro Government's Initial Request for Information (Mar. 10, 2023), Item 23 ("Response LFUCG LJC, 1-__"). The IRA is a material change in circumstance with impacts that are still being determined. Rye Development disagrees with the Companies' ***assumption*** concerning the impact of the IRA on the pumped storage hydro evaluation. *See,* Response LFUCG LJC 1-45. A proper reevaluation is warranted.

[16] *See* AN ACT relating to economic relief for local communities of the Commonwealth and making an appropriation therefor., Ky Acts 2023, Ch. 186 (House Bill 9 signed by Governor, Apr. 7, 2023). The General Assembly supports "priority communities" in the Commonwealth, "areas impacted by concentrated, direct coal related job losses from mine and power plant closures in recent years as designated by the Interagency Working Group." The intent of House Bill 9 includes efforts to "[e]nhance development of previously mined areas or areas previously used by the coal industry and other industrial activities into uses that diversify the local economy."

V. CONCLUSION

For all of the foregoing reasons, Rye believes the Companies analysis of pumped storage projects is flawed and merits further guidance and investigation from the Commission. Of note, the Companies' analysis does not properly take into account the amount of capacity these resources will provide, in addition to the numerous other benefits they offer, such as system optimization, weather hardening, fuel independence, and system reliability. When properly evaluated on an "apples-to-apples" basis with any other resource type, pumped storage resources have been found throughout the United States to be amongst the least-cost, most reliable, cleanest, dispatchable capacity resources available. Therefore, until the Companies perform a more accurate analysis of these resources, Rye respectfully requests that the Commission delay the approval of their requested CPCNs. Delaying the approval of these CPCNs is the other way to ensure that Kentucky ratepayers are not overpaying for the wrong set of resources, which have not been shown to be the least-cost or most reliable resources available to the Companies.

Nate Sandvig
Vice President