Southern Renewable Energy Association

P.O. Box 14858, Haltom City, TX 76117

KENTUCKY POWER COMPANY ("KPC")

2020 INTEGRATED RESOURCE PLAN

CASE NO. #2019-00443

COMMENTS OF THE SOUTHERN RENEWABLE ENERGY ASSOCIATION

October 16, 2020

The Southern Renewable Energy Association (SREA) is an industry-led initiative that promotes the use and development of renewable energy in the south. Since 2013, SREA has engaged in integrated resource plan (IRP) processes in Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Tennessee, and Virginia. We strive to provide the most up-to-date publicly available market information regarding renewable energy resource availability, pricing, performance, and forecasting. SREA appreciates the opportunity to comment on the Kentucky Power Company (KPC) Integrated Resource Plan (IRP).

On April 3, 2020, SREA filed a request with the Kentucky Public Service Commission (PSC) to formally intervene in this case. No intervening party, nor KPC opposed our intervention request. On April 13, 2020, the Kentucky PSC issued an Order denying SREA's request to intervene. The Order cites Commission regulation 807 KAR 5:001, Section 4(4), that states in part: "A person shall not file a paper on behalf of another person, or otherwise represent another person, unless the person is an attorney licensed to practice law in Kentucky or an attorney who complied with SCR 3.030(2)." Hiring local legal counsel in Kentucky would require tens of thousands of dollars, in addition to the normal costs associated with IRP involvement. SREA has been involved with IRPs across the southeast, including with SWEPCO, another AEP subsidiary company, without local legal counsel requirements. As such, the PSC's regulation requiring local legal counsel causes more direct engagement in this and other IRPs to be cost-prohibitive. SREA requests that the Kentucky PSC work to find ways to reduce barriers for public engagement in IRP processes. Further, SREA would like to be allowed to attend the November 2, 2020 informal hearing.

KPC noted in the filed IRP that "Kentucky Power prepared and analyzed additional scenarios following feedback from a Technical Conference held with key stakeholders."[1] SREA was not invited to be a part of the Technical Conference, and was unaware that KPC had an option for engagement that does not require local legal counsel. SREA would like to be involved in future pre-filing Technical Conferences, and encourages KPC to conduct similar stakeholder engagement in the next IRP.

SREA appreciates the Kentucky PSC's willingness to accept written comment from any party on IRPs. SREA has filed comments regarding IRPs for Big Rivers Cooperative, Eastern Kentucky Power Cooperative, Louisville Gas & Electric and Kentucky Utilities, and Kentucky Power. Kentucky PSC staff have cited SREA's

[1] IRP at 5.2.2.4, pg. 123

comments in staff reports, and we appreciate the due diligence from the PSC, PSC staff, and the utilities filing IRPs.

KPC's Renewable Energy Assumptions Are Too High

SREA appreciates KPC's transparency in publishing data input assumptions associated with renewable energy and energy storage resources. SREA also appreciates all the intervening parties' requests for KPC to file the data in spreadsheet format, which made reviewing this IRP much easier. SREA requests that KPC, and all other IRPs filed with the Kentucky PSC, follow KPC's example in filing data in an easily-accessible format early in the IRP process. In some Kentucky IRPs, companies heavily redacted data inputs, making it impossible to determine the reasonableness of the assumptions used, especially for parties that are not allowed to intervene.

KPC evaluated two "tiers" of wind energy resources and two tiers of solar energy resources. KPC's data assumptions are nearly $50/MWh in 2023 and $60/MWh in 2024 for both wind and solar resources. These cost assumptions for renewable energy resources are approximately 200% higher than current market offerings and anticipated near-term forecasted prices. KPC's cost assumptions for renewable energy resources are flat to increasing over the next decade, which at face value, is contrary to all reasonable forecasts. The two tiers for both wind and solar resources are virtually the same and represent only about a 10% pricing difference; this is not a robust sensitivity test. By using artificially inflated renewable energy pricing, KPC's modeling efforts in this IRP are overestimating the cost of renewable energy resources, and underestimating the near-term savings associated with large scale renewable energy procurement.

KPC Renewable Energy IRP Assumptions Are Inaccurate

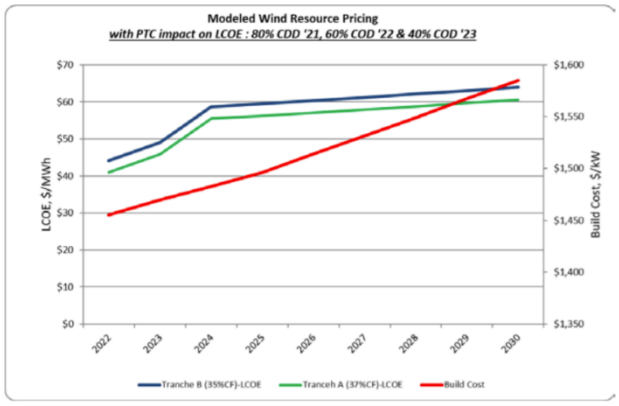


Figure 31. Levelized Cost of Electricity (LCOE) of Wind Resources (Nominal $/MWh)

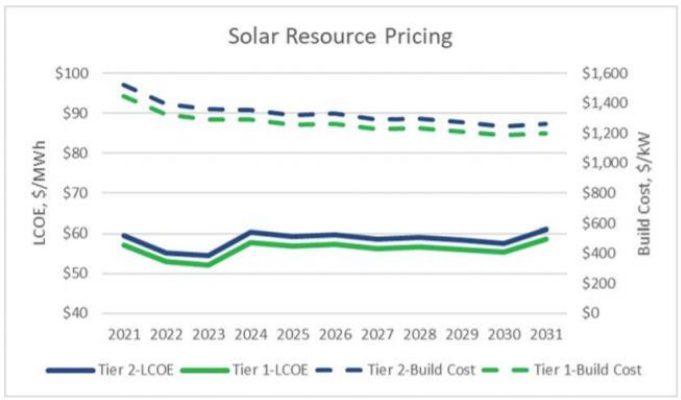


Figure 29. Large-Scale Solar Pricing Tiers with Investment Tax Credits

SREA recommends that KPC use the National Renewable Energy Lab's (NREL) Annual Technology Baseline (ATB) for renewable energy and energy storage cost assumptions. NREL's ATB data is free to use and considered industry standard because it reflects recent market offerings for renewable energy resources. For example, NREL's 2020 ATB shows solar and wind energy resources for a levelized cost of energy (LCOE) of approximately $30/MWh.[2] These values do not include the federal production tax credit (PTC) for wind energy, nor the federal investment tax credit (ITC) for solar energy, which would decrease these costs further.

[2] NREL (National Renewable Energy Laboratory). 2020. 2020 Annual Technology Baseline. Golden, CO: National Renewable Energy Laboratory. [https://atb.nrel.gov/]

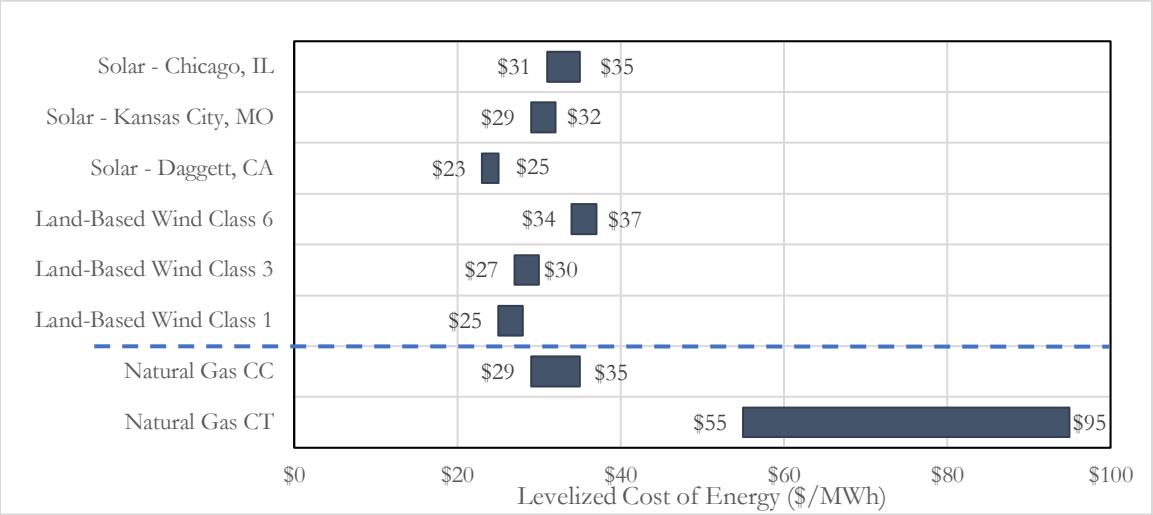
Sample Data from NREL's ATB

	Year	Overnight CapEx $/kW	Capacity Factor	LCOE $/MWh	LCOE $/MWh w/tax credit
Solar*	2021	$1,274	28%	$30	$24
	2030	$819	29%	$18	$17
Wind**	2021	$1,430	46%	$29	$13
	2030	$1,175	48%	$23	n/a

Source: NREL ATB 2020[3]

*Solar resources are based on NREL's Kansas City-Moderate data
**Wind resources are based on NREL's Class 3-Moderate data

NREL ATB LCOE Range by Technology, Unsubsidized (2021)



Source: NREL ATB 2020[4]

SREA recommends benchmarking IRP model assumptions for renewable energy resources against the LCOE data from NREL's ATB as well as against other publicly available data from requests for proposals (RFPs) or actual power purchase agreement (PPA) contracts. By comparing IRP model LCOEs against external values, internalized variables can be pinpointed as artificially increasing cost estimates. For example, in other IRP proceedings, SREA has found that a utility's internal cost assumptions regarding asset ownership can drastically increase the costs of renewable energy resources. Internal utility assumptions regarding self-ownership of new renewable energy generation assets tends to double-count financing costs. Based on the latest NREL ATB, KPC's renewable energy cost assumptions are approximately 200% higher (~$60/MWh) than anticipated in the near-term (~$30/MWh). Recent RFI/RFP results corroborate NREL's ATB.

Santee Cooper RFI Results

Santee Cooper, a South Carolina electric utility, published a Request for Interest and Indicative Pricing (RFI) in October 2019. Santee Cooper also indicated that through a future Request for Proposal (RFP), the utility would seek power purchase agreements (PPA's) for 1,000 MW of installed solar capacity by 2024. Within one month of issuing the RFI, Santee Cooper received 25 submissions representing 245 options from 76 different

[3] National Renewable Energy Lab (2020). Annual Technology Baseline (ATB) Data. [https://atb.nrel.gov/electricity/2020/data.php]
[4] Ibid.

solar power projects. Indicative 20-year levelized solar power prices provided to Santee Cooper averaged $27.90/MWh. Proposed energy storage costs ranged from $210/kWh to $375/kWh depending on energy configuration.[5]

Indicative Prices for Adding Energy Storage to Solar Capacity and Energy Projects			
Project ID No.	COD	Storage Hours	PV of Proposed Storage Charges ($/kWh)
11.21	Jan-22	1	210
11.23	Jan-22	3	215
11.27	Jul-22	3	244
11.35	Jul-22	3	244
11.19	Jul-22	3	249
11.31	Jul-22	3	249
11.25	Jul-22	1	280
11.33	Jul-22	1	280
11.17	Jul-22	1	285
11.29	Jul-22	1	285
2.12	Dec-23	4	329
25.4	Apr-22	4	331
25.1	Apr-22	2	350
19.2	Oct-23	2	375

Solar Capacity and Energy Projects Indicative 20-Year Level Prices			
Project ID	Transmission Interconnection	Project Capacity (MWac)	Levelized Energy Price ($/MWh)
14.4	Southern Company	125	24.95
22.1	ITN[2]	100	26.00
16.2	ITN	100	27.85
18.1[3]	ITN	100	28.39
18.3	ITN	100	28.39
13.5	ITN	40	28.75
8.2	ITN	75	28.91
13.8	ITN	20	29.15
24.15	ITN	74	29.22
13.2	ITN	45	29.25
11.13	ITN	75	29.29
Total (Rounded)	ITN	854	27.90

Source: nFront Consulting 2019[6]

NIPSCO RFP Results

Northern Indiana Public Service Company (NIPSCO), an electric company in the MISO system, held an integrated resource plan (IRP) meeting on July 24, 2018 to discuss renewable energy options. As part of its IRP process, NIPSCO shared results from an all source request for proposals (RFP) summary. NIPSCO received bids for wind energy, solar energy, energy storage, and amalgamations of those resources together. The company received proposals across five states, predominately via power purchase agreement (PPA), but also as asset sale or option. Resources offered as asset sale or as an option were provided at an average bid cost of $1,151.01/kW for solar energy projects, and $1,457.07/kW for wind energy projects. For PPAs, average bids for solar energy reached $35.67/MWh, and average bids for wind energy reached $26.97/MWh. Solar-plus-energy storage projects were offered as asset sales at $1,182.79/kW and as a PPA at $5.90/kW-Mo plus $35/MWh.[7] These values provide recent market data that are relevant to states in MISO and further south. Subsequently, NIPSCO's IRP recommended[8]:

- By 2023, adding approximately 1,150 MW of solar and solar+ storage, 160 MW of wind, 125 MW of DSM and 50 MW of market purchases to the NIPSCO supply portfolio

[5] nFront Consulting LLC (November 20, 2019). Initial Assessment of RFI Submittals. [https://admin.sc.gov/sites/default/files/Exhibit%20A%20-%20Santee%20Cooper%20Reform%20Plan.PDF]
[6] nFront Consulting LLC (November 20, 2019). Initial Assessment of RFI Submittals. [https://admin.sc.gov/sites/default/files/Exhibit%20A%20-%20Santee%20Cooper%20Reform%20Plan.PDF]
[7] Northern Indiana Public Service Company (July 24, 2018). NIPSCO Integrated Resource Plan 2018 Update Public Advisory Meeting Three. [https://www.nipsco.com/docs/default-source/about-nipsco-docs/7-24-2018-nipsco-irp-public-advisory-presentation.pdf]
[8] Northern Indiana Public Service Company (October 18, 2018). NIPSCO Integrated Resource Plan - 2018 Update. Public Advisory Meeting Five. [https://www.nipsco.com/docs/default-source/about-nipsco-docs/nipsco-irp-public-advisory-meeting-october-18-2018-presentation.pdf]

- Retiring all NIPSCO's coal capacity by the end of 2028

NIPSCO RFP Responses by Technology 2018

	Technology	# of Bids	Bid MW (ICAP)	# of Projects	Project MW	Average Bid Price	Pricing Units	Comments
Asset Sale or Option	Combine Cycle Gas (CCGT)	7	4,846	4	3,055	$959.61	$/kW	
	Combustion Turbine (CT)	1						
	Solar	9	1,374	5	669	$1,151.01	$/kW	
	Wind	8	1,807	7	1,607	$1,457.07	$/kW	
	Solar + Storage	4	705	3	465	$1,182.79	$/kW	
	Wind + Solar + Storage	1						
	Storage	1						
Purchase Power Agreement	Combine Cycle Gas (CCGT)	8	2,715	6	2,415	$7.86	$/kW-Mo	+ fuel and variable O&M
	Solar + Storage	7	1,055	5	755	$5.90	$/kW-Mo	+ $35/MWh (Average)
	Storage	8	1,055	5	925	$11.24	$/kW-Mo	
	Solar	26	3,591	16	1,911	$35.67	$/MWh	
	Wind	6	788	4	603	$26.97	$/MWh	
	Fossil	3	1,494	2	772	N/A		Structure not amenable to price comparison
	Demand Response	1						
	Total	**90**	**20,585**	**59**	**13,247**			

Source: NIPSCO 2018[9]

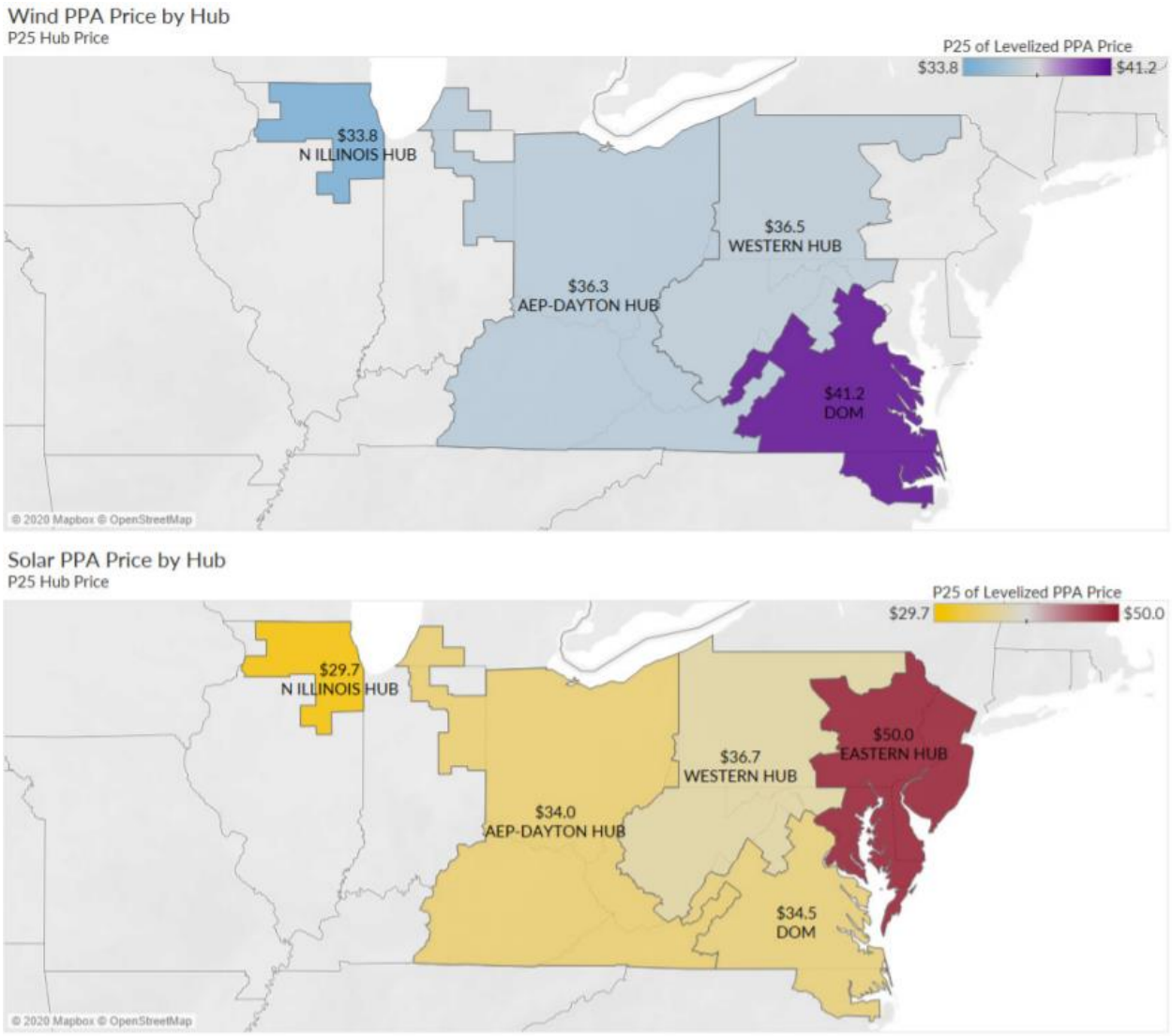
Additional Utility Benchmarks

In 2018, SREA filed comments in the Big Rivers Energy Cooperative ("BREC") IRP docket (#2017-00384). BREC's IRP found no need for renewable energy resources in the near-term, but the IRP contained significant deficiencies that hampered renewable energy review. On May 27, 2020, BREC announced two new solar PPA's for up to 260 MW's.[10] SREA notes this as an example of a Kentucky IRP that undervalues renewable energy resources, only to be corrected when current market information is available. Additionally, Owensboro Municipal Utilities (OMU) and Kentucky Municipal Energy Agency (KyMEA) recently announced an 86-megawatt solar power purchase agreement.[11]

Several other publicly available data points exist for recent renewable energy PPAs. For example, the Georgia Power 2019 IRP has stated that the company's average solar power purchase agreement reached $36/MWh in 2017.[12] In North Carolina, competitive procurement of solar energy resources recently led to an average price of $31.24/MWh per proposal.[13] In Lafayette, Lafayette Utilities System (LUS) recent wind energy PPA for 50 megawatts (MW) is currently providing energy for $31.86/MWh and is providing nearly 20% of Lafayette's

[9] Northern Indiana Public Service Company (July 24, 2018). NIPSCO Integrated Resource Plan 2018 Update Public Advisory Meeting Three. [https://www.nipsco.com/docs/default-source/about-nipsco-docs/7-24-2018-nipsco-irp-public-advisory-presentation.pdf]
[10] Big Rivers Electric Cooperative (May 27, 2020). "Big Rivers Announces Solar Power Purchase Agreements." [https://www.bigrivers.com/big-rivers-announces-solar-power-purchase-agreements/]
[11] Owensboro Municipal Utility (September 20, 2018). "OMU to include solar power in supply portfolio." [https://omu.org/blog/2018/09/20/omu-to-include-solar-in-power-supply-portfolio/]
[12] Georgia Power Company (January 2019). 2019 Integrated Resource Plan, Docket #42310. [http://www.psc.state.ga.us/factsv2/Document.aspx?documentNumber=175473]
[13] Accion Group (April 9, 2019). Competitive Procurement of Renewable Energy Independent Administrator's Report. [https://starw1.ncuc.net/NCUC/ViewFile.aspx?Id=d2a72630-6104-4359-96ff-ab6229e7b1e0]

energy.[14] LevelTen Energy, and independent aggregator of renewable energy buyers and sellers, releases quarterly information regarding renewable energy PPA's by region. Recent wind energy PPA prices in the PJM AEP-Dayton Hub area are near $36.3/MWh and solar energy PPA prices are approximately $34/MWh.



Source: LevelTen Energy 2020[15]

[14] Available upon request.

[15] LevelTen Energy (July 27, 2020). LevelTen Releases Q2 2020 PPA Price Index, Including the First Price Index of Transactable European PPA Offers [https://leveltenenergy.com/blog/ppa-price-index/q2-2020/]

Multiple Generation Technologies Must Be Evaluated

Wind energy, solar energy, hybrid resources (meaning renewable plus energy storage), and stand-alone energy storage resources are all currently present in the PJM generation interconnection queue, and other areas near Kentucky. Because multiple geographic locations, technology configurations, and contractual options are reasonable resources meriting unique analysis, KPC should include evaluation of:

- In-state renewable energy resources
- Out-of-state renewable energy resources elsewhere in PJM
- Fixed-tilt and single-axis tracking solar energy resources
- Hybrid and energy storage resources
- Self-build, build-own-transfer and power purchase agreement contractual configurations

It appears that KPC only evaluated in-Kentucky resources. KPC evaluates two versions of both wind energy ("Tranche A" and "Tranche B") and solar energy resources ("Tier 1" and "Tier 2"); however, the differentiation for both resources is so small to be virtually indistinguishable. Specifically, KPC states that:

- "Large-scale solar resources were made available in two tiers, with up to 152 MW of each tier available each year beginning in 2022, for a total of up to 304 MW annually. Initial costs for Tier 1 were approximately $52.96/MWh in 2022 with the ITC. Tier 2 has an initial cost of approximately $55.24/MWh in 2022 with the ITC."
- "Wind resources were made available up to 200 MW annually beginning in 2023 (commercial operation date 12/31/22). One 100 MW unit of each Tranche A and B was available each year. Tranche A has an LCOE of $45.93/MWh, in 2023 with the PTC. Tranche B has an LCOE of $49.06/MWh, in 2023 with the PTC. Wind resources are assumed to have a PJM capacity value equal to 12.3% of nameplate rating."

Renewable Energy Resources Should Be Co-Optimized

KPC restricts wind energy generation to 30% by 2040. KPC explains that, "This cap is based on the DOE's Wind Vision Report which suggests from numerous transmission studies that transmission grids should be able to support 20% to 30% of intermittent resources in the 2020 to 2030 timeframe. The cap for Kentucky Power allows the model to select up to 30% of generation energy resources as wind-powered by 2040." However, the DOE's report was published in 2015 and is based on 2030, not 2040. Since the publication of the DOE's report five years ago, several states have already surpassed the 30% wind energy generation penetration, including Iowa, Kansas and Oklahoma[16] with hourly peak wind production reaching over 70% in SPP.[17] The DOE Wind Vision Report is no longer a reasonable resource for modeling a cap on wind energy resources.

KPC restricts solar energy generation to 15%, noting that "Over the planning period, the maximum threshold for solar resource additions was limited to approximately 15% of Kentucky Power's load obligation or 455

[16] American Wind Energy Association (2020). Wind Powers America Annual Report 2019. [https://engage.awea.org/Shop/product-catalog/Product-Details?productid={C74CAA06-687A-EA11-8103-000D3A03FAAF}]

[17] RTO Insider (February 6, 2020). SPP Sets 71.3% Wind Penetration Mark. [https://rtoinsider.com/spp-sets-wind-penetration-mark-154435]

MW." However, California has already surpassed 22% of total generation provided by solar[18] and Nevada has also passed 15% solar penetration.[19]

KPC states that capping renewable energy resources is necessary due to modeling limitations. The company gives as an example that "as solar costs continue to decrease relative to the market price of energy there will come a point where the optimization model will theoretically pick an unlimited amount of solar resources." Instead of capping renewable energy resources, KPC should let the model co-optimize renewable energy resources to achieve the best mixture of renewable resources to serve its load.

Renewable Energy Resources Should Be Selectable Earlier

KPC's models prohibited solar resource selection prior to 2022, and wind resources prior to 2023 "due to the amount of time necessary to secure resources and obtain any necessary regulatory approvals". The company also restricted the quantity of annual solar additions to 152 MW's per year, and wind additions to 200 MW per year. In KPC's 2016 IRP, the company restricted wind additions to 300 MW per year – higher than this IRP. Earlier this year, AEP Partners issued an RFP for wind and solar energy resources in PJM. The RFP was issued in August, with contract execution within five months. The RFP was broad to include multiple technologies, with COD's of 2021, 2022 or 2023 for up to 500 MW's. KPC's IRP model assumptions are more restrictive than its affiliated companies which unnecessarily delays renewable energy procurement and increases costs to ratepayers.

AEP Partners 2020 Wind and Solar Energy Resources located in PJM RFP Timeline

Invitation to participate	August 3, 2020
Provide intention to bid on or before; (Note: Bid Packets will only be sent to those companies who provided an intention to bid)	August 13, 2020
Bid Packets provided by AEPEP on or before	August 14, 2020
Bids due to AEPEP	August 28, 2020
Short list selected	Late September 2020
Expected REPA Execution (300-500MW)	Q4 2020

Source: AEP Partners 2020[20]

Energy Storage Evaluation Needs Improvement

Due to the newness of energy storage, IRP modeling software programs are often unable to adequately evaluate the full range of value associated with energy storage. This is an industry-wide problem, and not one specific to KPC or its use of the Plexos modeling software program. Software programs such as PROMOD, Plexos, and Aurora all have individual strengths and weaknesses regarding energy storage modeling. However, it is unclear if KPC evaluated a "value stack" of potential for energy storage and hybrid energy systems. Thus, no firm conclusions regarding energy storage can or should be based on KPC's IRP results at this time.

Further, forecasting energy storage value is difficult given the paucity of available data. Forecasting energy arbitrage (charging batteries when energy locational marginal prices are low, and discharging when energy prices are high), and even capacity value might have some veracity; however, energy storage resources also provide

[18] Solar Energy Industries Association (2020). State Solar Spotlight California.
[https://www.seia.org/sites/default/files/2020-09/California.pdf]
[19] Solar Energy Industries Association (2020). State Solar Spotlight Nevada.
[https://www.seia.org/sites/default/files/2020-09/Nevada.pdf]
[20] AEP Energy Partners Request for Proposals for Wind and Solar Energy Resources located in PJM
[https://aep.com/newsroom/resources/docs/AEPEPPJMAugust2020RenewableGenerationRFP.pdf]

substantial ancillary services that are frequently ignored in IRP modeling, such as frequency and voltage support, ramp up and down capabilities, and synthetic inertia. Even if these ancillary services were accounted for in IRP modeling software, little forecasting data exist to account for the value of those services. In effect, energy storage can provide value that is unaccounted for in IRP modeling. KPC would need to work with its contractors and partners to create a framework to properly evaluate the full value stack of energy storage devices, to ensure that KPC is not unintentionally missing opportunities.

KPC notes that "The [battery] storage resource characteristics and cost were updated in early 2019." However, Figure 27 shows that the energy storage installed cost values are from BNEF in 2018. Also, the data provided to stakeholders states pricing forecasts are from "Update: 10/22/2018 - Tesla/BNEF".[21] It is unclear if the pricing provided in the IRP are overnight capital costs, and what all cost variables are included in the assumptions. Based on the provided information, it appears that the costs used by KPC are higher than current market offerings.

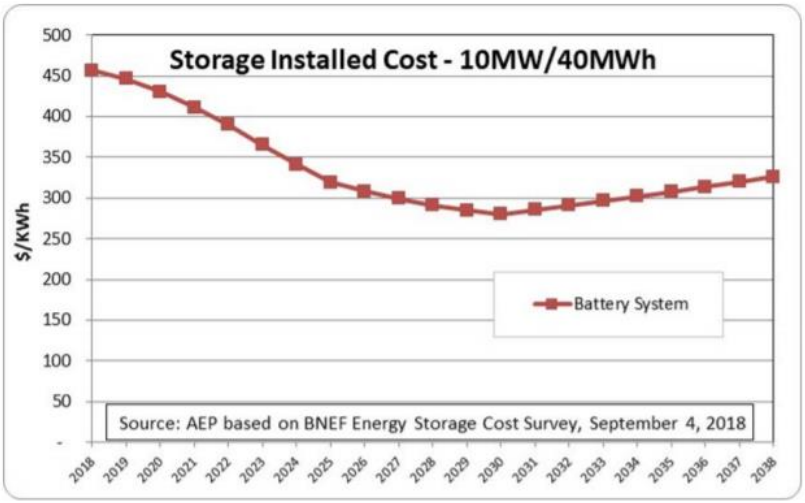


Figure 27. Energy Storage Installed Cost

For example, as mentioned previously in these comments, an RFI response in South Carolina showed adding energy storage may cost between $210-$375/kWh in 2022, with various energy configurations.[22] Along with renewable energy pricing, the NREL ATB also provides pricing forecasts for both 4-hour and 2-hour energy storage projects.[23] Compared to NREL ATB, KPC's energy storage cost assumptions are 20-30% higher than a moderate forecast for 4 hour battery storage systems. NREL's ATB data align very well with the data provided through Santee Cooper's RFI.

[21] Kentucky Power Company (2020). Kentucky Power Companys filing of responses to the Kentucky Industrial Utility Customers, Inc Set of Data Requests. [https://psc.ky.gov/pscecf/2019-00443/Sebishop%40aep.com/05212020041818/KPCO_R_KIUC_1_11_PublicAttachment3.xlsx]

[22] nFront Consulting LLC (November 20, 2019). Initial Assessment of RFI Submittals. [https://admin.sc.gov/sites/default/files/Exhibit%20A%20-%20Santee%20Cooper%20Reform%20Plan.PDF]

[23] While the NREL ATB only provides energy storage cost assumptions on a $/kW basis, the underlying source data provides costs on a $/kWh basis, with an explanation that: "We use the units of $/kWh because that is the most common way that battery system costs have been expressed in published material to date. The $/kWh costs we report can be converted to $/kW costs simply by multiplying by the duration (e.g., a $300/kWh, 4-hour battery would have a power capacity cost of $1200/kW)." Wesley Cole and A. Will Frazier (June 2020). Cost Projections for Utility-Scale Battery Storage: 2020 Update. [https://www.nrel.gov/docs/fy20osti/75385.pdf]

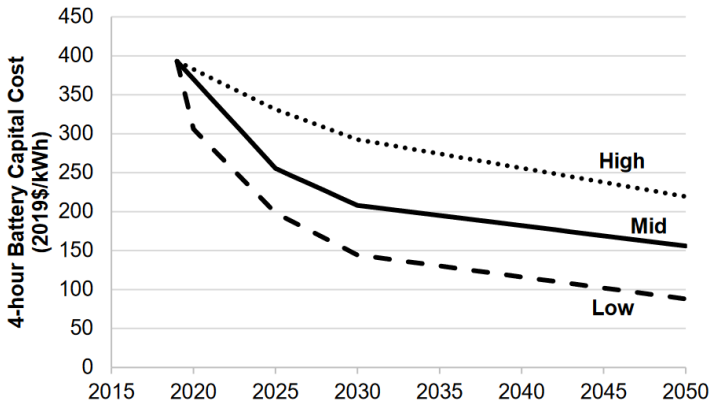
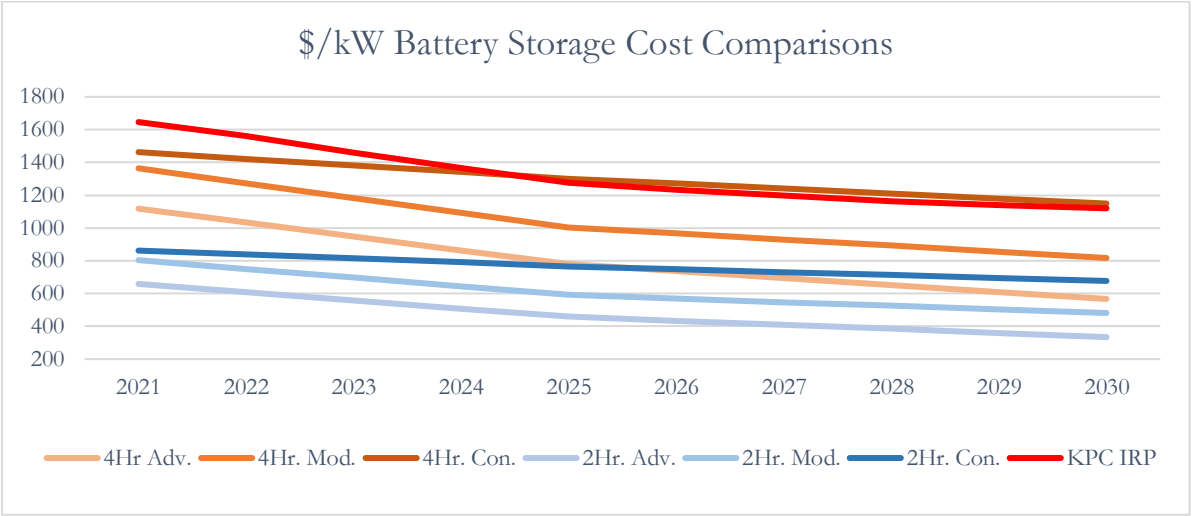


Figure ES-2. Battery cost projections for 4-hour lithium ion systems.

Source: NREL 2020[24]



Source: NREL ATB 2020[25] and KPC[26]

In this IRP, KPC notes that "Battery Storage is excluded in the 2019 plan." However, AEP/KPC filed a request with the Federal Energy Regulatory Commission (FERC) to approve its Middle Creek energy storage project in July 2020, noting that the company had presented this new project in January 2020 at a PJM stakeholder meeting.[27] The Middle Creek energy storage project is described as a 2MW/14MWh project for $9.7 million. The project's inferred cost of $692/kWh is substantially higher than the company's' cost assumptions in this

[24] Wesley Cole and A. Will Frazier (June 2020). Cost Projections for Utility-Scale Battery Storage: 2020 Update. [https://www.nrel.gov/docs/fy20osti/75385.pdf]
[25] National Renewable Energy Lab (2020). Annual Technology Baseline (ATB) Data. [https://atb.nrel.gov/electricity/2020/data.php]
[26] Kentucky Power Company (2020). Kentucky Power Companys filing of responses to the Kentucky Industrial Utility Customers, Inc Set of Data Requests. [https://psc.ky.gov/pscecf/2019-00443/Sebishop%40aep.com/05212020041818/KPCO_R_KIUC_1_11_PublicAttachment3.xlsx]
[27] AEP Transmission (January 17, 2020). SRRTEP Committee Western AEP Supplemental Projects [https://www.pjm.com/-/media/committees-groups/committees/srrtep-w/2020/20200117/20200117-aep-supplemental-projects.ashx]

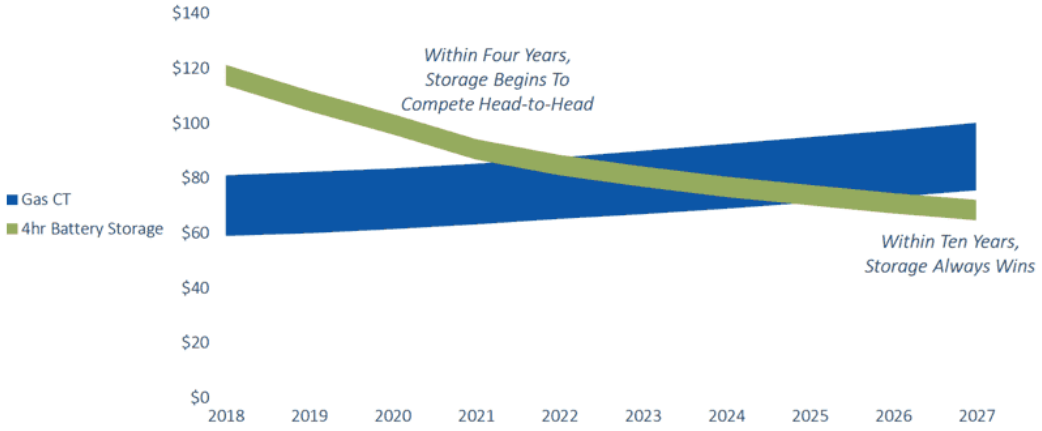
IRP, and other publicly available materials provided in these comments. It is unclear if KPC conducted an RFP for this energy storage project.

In its FERC filing, the company notes that, "AEP will file applications for certificates of public convenience and necessity ("CPCN") with the Public Service Commission of Kentucky for approval to construct Phases 1 and 2 of the Middle Creek Project. AEP anticipates filing the Phase 1 CPCN application in the third quarter of 2020." The project is not mentioned in this IRP.

Model Natural Gas as a Short-Term Resource

At a presentation given by GTM Research in 2018, cost forecasts for energy storage showed that within ten years, energy storage would always be the cheaper option compared to new combustion turbine gas units. Given that energy storage prices are plummeting at an increasingly rapid pace, new-build natural gas units may not have the 30-40 year life expectancies that most utilities traditionally assume. Instead, as a sensitivity, natural gas power plants should be modeled in IRPs as a 10-year asset.

WHEN WILL ENERGY STORAGE REPLACE PEAKER PLANTS?



Source: GTM 2018[28]

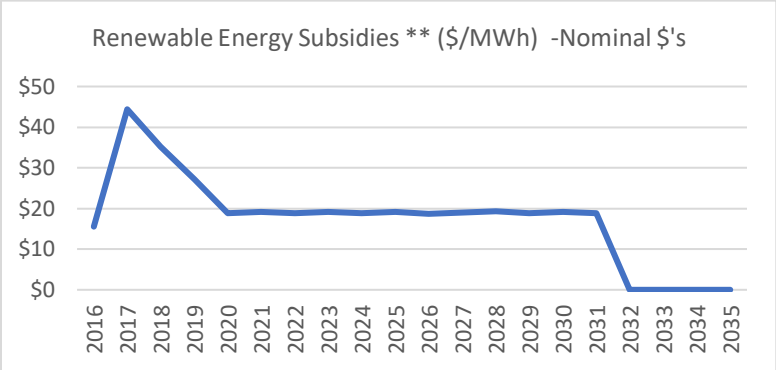
Tax Credit Methodology Needs Additional Information

KPC does include cost reductions associated with the federal Production Tax Credit (PTC) and Investment Tax Credit (ITC) for renewable projects; however, the IRP narrative does not seem to match data provided to stakeholders. In the Excel file KPCO_R_KIUC_1_09_Attachment1 ("Attachment 1"), Column AZ in spreadsheet "Annual-Prices Nominal" shows "Renewable Energy Subsidies ** ($/MWh) -Nominal $'s".[29] When charted, those data show a flat subsidy from 2020-2031, with no benefit after 2031. The data in Attachment 1 do not appear to match Figure 29 Large-Scale Solar Pricing Tiers with Investment Tax Credit, nor Figure 31 Levelized Cost of Electricity (LCOE) of Wind Resources (Nominal $/MWh). According to Figures 29 and 31, both wind and solar resources are anticipated to slowly increase in cost over the next few years as tax credits are phased out; however, Attachment 1 suggests the effects of the federal tax credits have

[28] GTM Research (March 1, 2018). Will energy storage replace peaker plants? [https://event.on24.com/eventRegistration/EventLobbyServlet?target=reg20.jsp&partnerref=UtilityDive&eventid=1588963&sessionid=1&key=D819B894CB820C7457242C81A9C81644&regTag=&sourcepage=register]

[29] Kentucky Power. https://psc.ky.gov/pscecf/2019-00443/Sebishop%40aep.com/05212020041818/KPCO_R_KIUC_1_09_Attachment1.xlsx

already expired in the 2020-2030 timeframe. Further, KPC states that, "The ITC benefit is included through 2030. At this point in time, the 10% ITC benefit would become indiscernible from potential variations in forecasted prices." But based on the information in Attachment 1, it appears KPC simply eliminated the ITC after 2030, despite continued anticipated savings. Further, the cost savings associated with the ITC are based on total capital cost and should be different based on different technology groups; as such, it is unclear if the Attachment 1 applies to wind, solar, and/or hybrid resources. SREA requests KPC provide clarification regarding how tax credits are applied in modeling.



Source: KPC 2020 Attachment 1[30]

Existing Generation Resources Are Higher Cost Than Renewables

KPC provided data regarding the Fixed O&M, Variable O&M, Fuel, and Capital costs of its existing generation fleet in KPCO_R_AG_1_16_Attachment1.[31] SREA appreciates this data being filed as part of the IRP process, and we request to the Kentucky PSC that these data be made available from all utilities in their own IRP processes, especially given that much of the data is already publicly available via FERC's Form 1.

Unit	Expense	2016	2017	2018	2019
Big Sandy 1 Gas	Fixed O&M	$18,900,854	$20,286,607	$17,389,254	$20,018,683
Big Sandy 1 Gas	Variable O&M	$3,900,102	$2,418,176	$3,152,015	$1,985,881
Big Sandy 1 Gas	Fuel	$17,304,093	$24,084,662	$25,341,135	$31,517,312
Big Sandy 1 Gas	Capital	$35,534,926	$5,121,282	$9,537,656	$8,255,405
Big Sandy 1 Gas	Net CF (%)	22%	23%	25%	42%
Big Sandy 1 Gas	Net Gen. (MWh)	530,333	563,778	624,804	1,062,893
	$/MWh	$142.63	$92.08	$88.70	$58.12

Source: Kentucky Power 2020[32]

[30] Kentucky Power Company (2020). Kentucky Power Companys filing of responses to the Kentucky Industrial Utility Customers, Inc Set of Data Requests. https://psc.ky.gov/pscecf/2019-00443/Sebishop%40aep.com/05212020041818/KPCO_R_KIUC_1_09_Attachment1.xlsx

[31] Kentucky Power Company (2020). Kentucky Power Company filing response to Attorney Generals First Set of Data Requests. https://psc.ky.gov/pscecf/2019-00443/Sebishop%40aep.com/05212020025004/KPCO_R_AG_1_16_Attachment1.xlsx

[32] Ibid

Unit	Expense	2016	2017	2018	2019
Mitchell 1 Coal	Fixed O&M	$46,666,215	$56,498,234	$52,365,194	$65,458,700
Mitchell 1 Coal	Variable O&M	$9,514,391	$8,914,561	$8,510,724	$10,634,116
Mitchell 1 Coal	Fuel	$96,134,456	$80,694,626	$70,198,140	$58,632,057
Mitchell 1 Coal	Capital	$8,910,291	$16,056,330	$19,334,291	$21,393,911
Mitchell 1 Coal	Net CF (%)	52%	47%	38%	36%
Mitchell 1 Coal	Net Gen. (MWh)	3,521,877	3,136,303	2,571,251	2,426,553
	$/MWh	$45.78	$51.71	$58.50	$64.34

Source: Kentucky Power 2020[33]

Unit	Expense	2016	2017	2018	2019
Mitchell 2 Coal	Fixed O&M	$47,303,994	$56,763,512	$56,572,091	$63,487,973
Mitchell 2 Coal	Variable O&M	$9,188,358	$7,944,519	$11,591,272	$ 7,283,592
Mitchell 2 Coal	Fuel	$104,934,171	$108,727,583	$78,508,965	$65,754,315
Mitchell 2 Coal	Capital	$8,365,435	$14,308,213	$20,037,442	$15,418,191
Mitchell 2 Coal	Net CF (%)	60%	66%	42%	38%
Mitchell 2 Coal	Net Gen. (MWh)	4,162,822	4,551,593	2,932,042	2,614,728
	$/MWh	$40.79	$41.25	$56.86	$58.11

Source: Kentucky Power 2020[34]

Unit	Expense	2016	2017	2018	2019
Rockport 1 Coal	Fixed O&M	$70,478,679	$93,614,199	$82,175,568	$105,579,006
Rockport 1 Coal	Variable O&M	$7,147,669	$10,412,671	$10,234,078	$9,025,854
Rockport 1 Coal	Fuel	$155,816,706	$131,308,370	$167,409,050	$122,627,681
Rockport 1 Coal	Capital	$116,475,279	$78,946,797	$26,327,712	$42,107,635
Rockport 1 Coal	Net CF (%)	45%	41%	53%	34%
Rockport 1 Coal	Net Gen. (MWh)	5,262,209	4,701,838	6,173,901	3,940,531
	$/MWh	$66.50	$66.84	$46.35	$70.89

Source: Kentucky Power 2020[35]

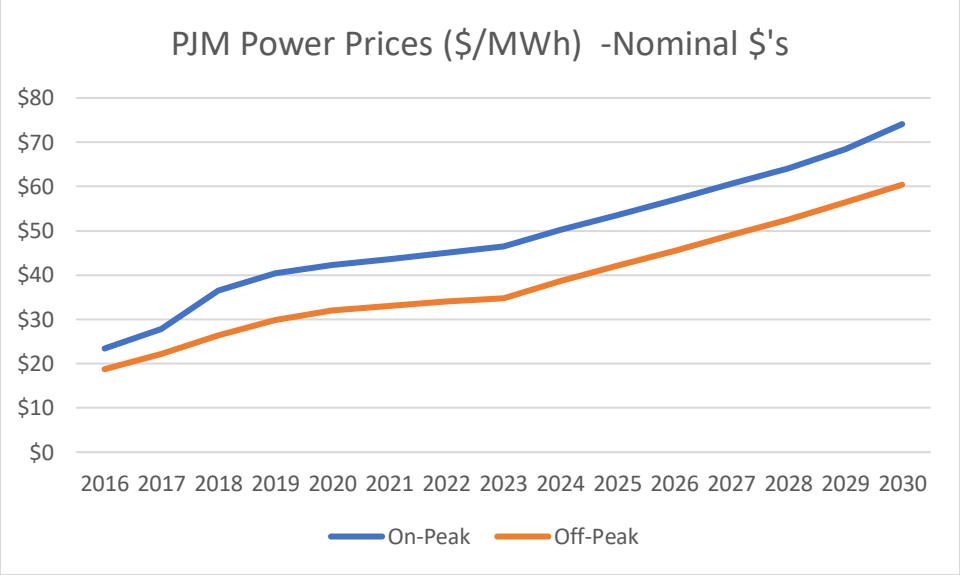
Unit	Expense	2016	2017	2018	2019
Rockport 2 Coal	Fixed O&M	$208,387,357	$226,636,514	$220,187,653	$237,694,886
Rockport 2 Coal	Variable O&M	$5,014,136	$5,057,112	$10,818,485	$5,856,312
Rockport 2 Coal	Fuel	$183,123,201	$174,530,602	$161,618,233	$127,961,693
Rockport 2 Coal	Capital	$44,651,131	$46,328,733	$55,030,213	$85,811,470
Rockport 2 Coal	Net CF (%)	55%	55%	50%	36%
Rockport 2 Coal	Net Gen. (MWh)	6,296,167	6,222,229	5,720,208	4,148,682
	$/MWh	$70.07	$72.73	$78.26	$110.23

Source: Kentucky Power 2020[36]

[33] Ibid
[34] Ibid
[35] Ibid
[36] Ibid

Based on the data provided by KPC, none of the company's existing facilities operated at less than $40/MWh at any time in the past four years. Last year, KPC's lowest cost facility operated at $58.11/MWh. As shown earlier in these comments, renewable energy resources are readily available to KPC well below $40/MWh.

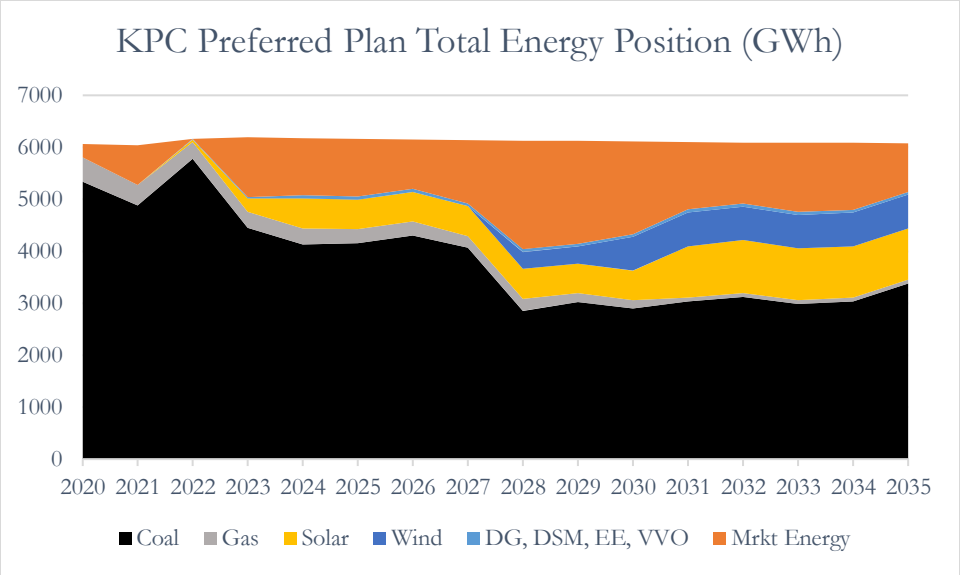
The Company's model runs show significant market (PJM) purchases for the next eight years, and then increasing significantly in 2028. KPC shows PJM power prices ranging from $30-$50/MWh for the next few years, making up approximately 20% of total energy purchases, jumping to over 30% beginning in 2028. Market purchases then begin to decline as more wind and solar energy resources are added later in the planning period. In effect, these results show that if KPC were to model renewable energy resources at less than PJM market prices, the KPC model should naturally select more renewable energy resources, sooner. By artificially inflating renewable energy prices to just above PJM prices, the model selects market purchases first. The annual total amount of market purchases in the model represent approximately 350-550 MW of wind energy and/or solar energy capacity.[37]



Source: KPC 2020 Attachment 1[38]

[37] Based on 25% and 40% capacity factors.

[38] Kentucky Power Company (2020). Kentucky Power Companys filing of responses to the Kentucky Industrial Utility Customers, Inc Set of Data Requests. https://psc.ky.gov/pscecf/2019-00443/Sebishop%40aep.com/05212020041818/KPCO_R_KIUC_1_09_Attachment1.xlsx



Source: Kentucky Power Company 2020[39]

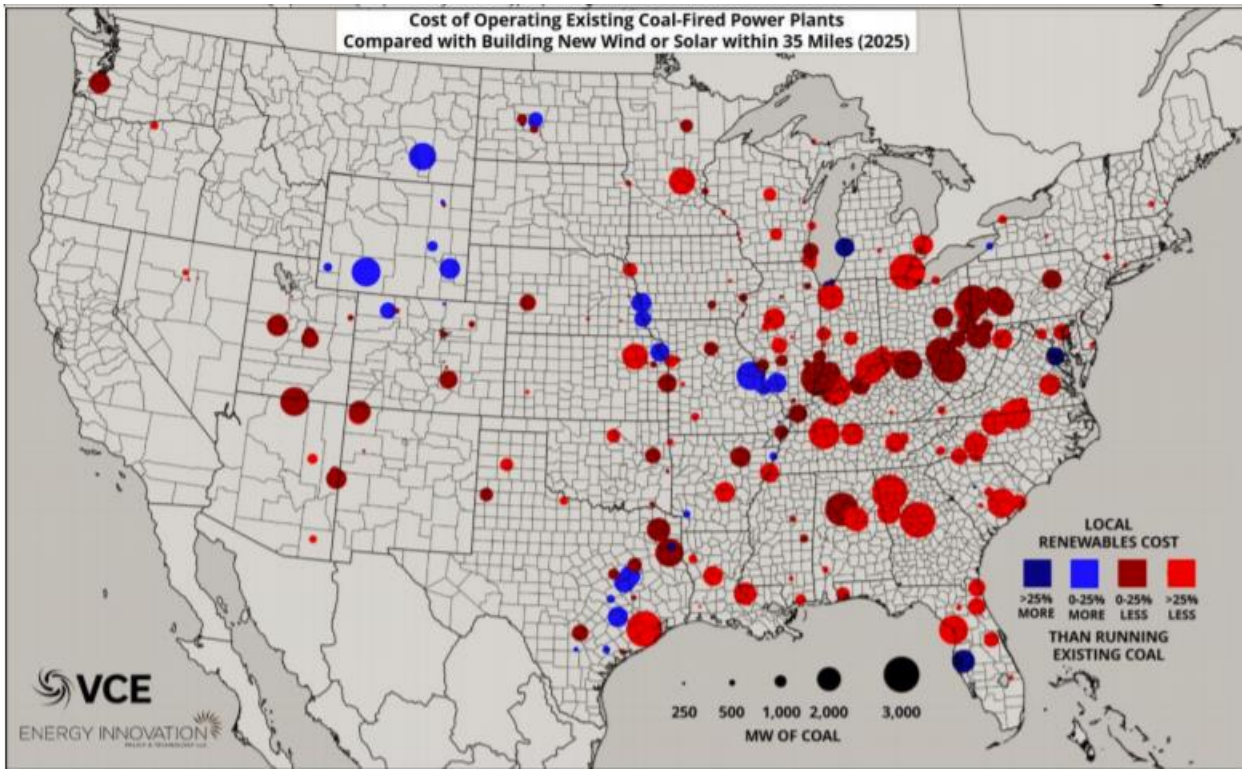
According to Moody's Investors Service, "Some coal plants still perform economically, but competitiveness could come under pressure as market conditions evolve...Most municipal- or G&T-owned coal plants in the US are old and have high production costs. According to the report, 72.3% of these plants, or about 65.0 gigawatts, have operating costs exceeding $30 per megawatt hour, which Moody's views as the threshold above which coal plants are vulnerable to be displaced by cheaper generation options. Newer units that came online after 2000 use more efficient technology and run at lower heat rates and operating costs, enabling many of them to be competitive with the market and achieve higher capacity factors. Others are located adjacent to coal mines, allowing them to eliminate transportation costs from their overall fuel expenses. Nonetheless, each plant's competitiveness will ultimately depend on external factors including the price of natural gas and renewable energy in the vicinity, regional transmission organization reserve margins and the extent of political support for various fuels."[40] As Moody's points out, broader energy market forces will render higher cost energy resources (such as existing steam turbine generation) obsolete and likely to be out-competed by lower-cost energy resources such as renewable resources.

Moody's observations bear out when renewable energy resources are optimized against existing generation fleets. For example, in a 2019 report that compared existing coal-fired power plants against renewable energy resources showed that all of Kentucky's coal-fired power plants are uneconomic by 2025.[41]

[39] Kentucky Power Company (2020). Kentucky Power Companys filing of responses to the Kentucky Industrial Utility Customers, Inc Set of Data Requests. [https://psc.ky.gov/pscecf/2019-00443/Sebishop%40aep.com/05212020041818/KPCO_R_KIUC_1_02_Attachment3.xlsx]

[40] Moody's Investors Service (April 5, 2018). "Some coal plants still perform economically, but competitiveness could come under pressure as market conditions evolve." [https://www.moodys.com/research/Moodys-Some-coal-plants-still-perform-economically-but-competitiveness-could--PR_381891]

[41] Energy Innovation (March 24, 2019). The Coal Cost Crossover: Economic Viability Of Existing Coal Compared To New Local Wind And Solar Resources. [https://energyinnovation.org/wp-content/uploads/2019/04/Coal-Cost-Crossover_Energy-Innovation_VCE_FINAL2.pdf]



Source: Energy Innovation and Vibrant Clean Energy 2019[42]

Issue an RFP

This is the third of three IRPs where KPC's preferred portfolio has identified near-term renewable energy needs. In the 2013 IRP, KPC noted that, "Kentucky Power considered the purchase of 100 MW of wind power as part of this IRP process and as a result of the evaluation performed, may pursue a Purchase Power Agreement (PPA) for wind power for delivery beginning in 2015."[43] In the 2016 IRP, KPC noted that its preferred portfolio "adds 75 MW (nameplate capacity)/year of wind resources beginning in 2018 for a total of 300 MW through 2021;" [and] "adds utility scale solar, beginning with 10 MW in 2019, for a total of 130 MW by 2031."[44] In this 2019 IRP, KPC's preferred plan adds 101 MW of solar by 2023 followed by an additional 152 MW's the next year, and 100 MW of wind energy resources by 2028. While other AEP subsidiaries are adding significant renewable energy resources, KPC does not. Every year that KPC avoids procuring renewable energy resources, its customers lose money. In this IRP, the company notes it plans to "Explore opportunities to initiate a Request for Proposal (RFP) to add cost-effective market capacity purchases and solar and wind resources in the near future"; however, given previous IRPs, it is unclear how the company's proposed action plan will be enacted and enforced.

[42] Ibid.
[43] KPSC Case No. 2013- 00475 2013 Integrated Resource Plan Of Kentucky Power Company Volume A - Public Version Page 14 of 222 [https://psc.ky.gov/PSCSCF/2013%20cases/2013-00475/20131220_Kentucky%20Power%20Company%20Application%20Volume%20A.pdf]
[44] KPSC Case No. 2016-00413 2016 Integrated Resource Plan Of Kentucky Power Company Volume A - Public Version Page 16 of 1497 [https://psc.ky.gov/pscecf/2016-00413/jkrosquist%40aep.com/12202016110531/KPCO_2016_IRP__Volume_A___Public__Version.pdf]

Kentucky Power Company IRP Recommendations

SREA requests that the Kentucky PSC:

- Work to find ways to reduce barriers for public engagement in IRP processes
- Allow SREA to attend the November 2, 2020 informal hearing
- Include SREA in future pre-filing Technical Conferences for the next IRP

Additionally, SREA recommends that for this and future KPC IRP's:

- Use the National Renewable Energy Lab's (NREL) Annual Technology Baseline (ATB) for renewable energy and energy storage cost assumptions
- Benchmark IRP model LCOE's for renewable energy resources against given LCOE's from NREL's ATB as well as publicly available data from requests for proposals (RFPs) or actual power purchase agreement (PPA) contracts
- Multiple resources should be evaluated, including:
    - In-state renewable energy resources
    - Out-of-state renewable energy resources elsewhere in PJM
    - Fixed-tilt and single-axis tracking solar energy resources
    - Hybrid and energy storage resources
    - Self-build, build-own-transfer and power purchase agreement contractual configurations
- Renewable energy resources should be co-optimized, not artificially capped
- Renewable energy resources should be selectable earlier
- A "value stack" for energy storage and hybrid energy systems should be created and used
- Tax credit methodology explanations are needed
- Natural gas should be modeled as a short-term resource
- Finally, we strongly urge KPC to issue an RFP, and follow through with procurement

CERTIFICATE OF SERVICE

This is to certify that the foregoing copy of the foregoing is a true and accurate copy of the document(s) being filed in paper medium; that the electronic filing was transmitted to the Commission on April 3, 2020 that there are currently no parties that the Commission has excused from participation by electronic means in this proceeding.

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