

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

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

NOTICE OF FILING

Notice is given to all parties that the following materials have been filed into the record of this proceeding:

- The digital video recording of the evidentiary hearing conducted on August 29, 2023 in this proceeding;
- Certification of the accuracy and correctness of the digital video recording;
- All exhibits introduced at the evidentiary hearing conducted on August 29, 2023 in this proceeding;
- A written log listing, inter alia, the date and time of where each witness' testimony begins and ends on the digital video recording of the evidentiary hearing conducted on August 29, 2023.

A copy of this Notice, the certification of the digital video record, and hearing log have been served upon all persons listed at the end of this Notice. Parties

desiring to view the digital video recording of the hearing may do so at <https://youtu.be/EwjA5eT85Z0>.

Parties wishing an annotated digital video recording may submit a written request by electronic mail to pscfilings@ky.gov. A minimal fee will be assessed for a copy of this recording.

Done at Frankfort, Kentucky, this 16th day of November 2023.

A handwritten signature in blue ink that reads "Linda C. Bridwell". The signature is written in a cursive style with a horizontal line underneath it.

Linda C. Bridwell

Executive Director

Public Service Commission of Kentucky

COMMONWEALTH OF KENTUCKY
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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 A DEMAND SIDE MANAGEMENT PLAN AND)
APPROVAL OF FOSSIL FUEL-FIRED GENERATING)
UNIT RETIREMENTS)

CASE NO.
2022-00402

CERTIFICATION

I, Candace H. Sacre, hereby certify that:

1. The attached flash drive contains a digital recording of the Formal Hearing conducted in the above-styled proceeding on August 29, 2023. The Formal Hearing Log, Exhibits, and Exhibit List are included with the recording on August 29, 2023;
2. I am responsible for the preparation of the digital recording;
3. The digital recording accurately and correctly depicts the Formal Hearing of August 29, 2023; and
4. The Formal Hearing Log attached to this Certificate accurately and correctly states the events that occurred at the Formal Hearing of August 29, 2023, and the time at which each occurred.

Signed this 16th day of November, 2023.



Candace H. Sacre
Administrative Specialist III



Stephanie Schweighardt
Kentucky State at Large ID# KYNP 64180
Commission Expires: January 14, 2027



Session Report - Detail

2022-00402 29Aug2023

Kentucky Utilities Company and Louisville Gas and Electric Company (KU/LG&E)

Date:	Type:	Location:	Department:
8/29/2023	Public Hearing\Public Comments	Hearing Room 1	Hearing Room 1 (HR 1)

Witness: Jim Grevatt; Michael Groggin; Lane Kollen; Andrew Levitt; Andrew McDonald; Emily Medine; Anna Sommer; John Wilson
 Judge: Kent Chandler; Angie Hatton; Mary Pat Regan
 Clerk: Candace Sacre

Event Time	Log Event
8:37:00 AM	Session Started
8:37:11 AM	Chairman Chandler Note: Sacre, Candace Back on the record.
8:37:33 AM	Chairman Chandler Note: Sacre, Candace Mr. Malone?
8:37:49 AM	Chairman Chandler Note: Sacre, Candace Procedural discussion. (Click on link for further comments.)
8:38:36 AM	Chairman Chandler Note: Sacre, Candace Mr. Malone?
8:38:37 AM	Atty Malone KCA Note: Sacre, Candace Emily Medine.
8:38:45 AM	Chairman Chandler Note: Sacre, Candace Witness is sworn.
8:38:53 AM	Chairman Chandler - witness Medine Note: Sacre, Candace Examination. Name and address?
8:39:24 AM	Atty Malone KCA - witness Medine Note: Sacre, Candace Direct Examination. Cause be filed responses and direct?
8:39:34 AM	Atty Malone KCA - witness Medine Note: Sacre, Candace Alterations, additions?
8:40:05 AM	Atty Malone KCA - witness Medine Note: Sacre, Candace Any other editions, corrections, alterations?
8:40:11 AM	Atty Malone KCA - witness Medine Note: Sacre, Candace Asked same questions, answers be same?
8:40:43 AM	Chairman Chandler Note: Sacre, Candace Procedural discussion. (Click on link for further comments.)
8:41:17 AM	Chairman Chandler Note: Sacre, Candace Questions?
8:41:44 AM	Chairman Chandler Note: Sacre, Candace Mr. Ingram?
8:41:53 AM	Atty Ingram KU/LG&E - witness Medine Note: Sacre, Candace Cross Examination. Make sure understand position with respect each coal fired generating unit retire. Commission should deny retirement of Brown 3?
8:42:40 AM	Atty Ingram KU/LG&E - witness Medine Note: Sacre, Candace Opinion decision should deny retirement Brown 3?
8:42:59 AM	Atty Ingram KU/LG&E - witness Medine Note: Sacre, Candace Same position Ghent 2?
8:43:07 AM	Atty Ingram KU/LG&E - witness Medine Note: Sacre, Candace Same position MC 1 and MC 2?

8:43:15 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Tell me difference?

8:43:38 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Position should grant retirement in this case?

8:43:51 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Believe companies met requirements SB-1 with respect MC 2?

8:44:10 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Same as no opinion or not have strong opinion?

8:44:17 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Familiar with KRS 278.300?

8:44:51 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Statute requires utility obtain Commission approval before financial commitments?

8:45:09 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Have responses?

8:45:15 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Turn to Response 3,

8:45:46 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Looking at KCA Response, Item 3, refers to your testimony page 2?

8:46:13 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace See question?

8:46:44 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Testimony referenced, reading, (click on link for further comments), correct?

8:47:04 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Describe request for declaratory judgment?

8:47:35 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Request approval not needed for four PPAs?

8:47:59 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Understand request for declaratory ruling Commission not need to approve entry into PPAs?

8:48:41 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Said Commission denied request for declaratory ruling, asked for support, what Request 3 says?

8:49:06 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Quoted procedural Order in this case?

8:49:17 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Commission denied request for declaratory ruling?

8:50:05 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Your position Commission has denied request for declaratory ruling?

8:50:29 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Read response?

8:50:40 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Said Commission denied ruling, still believe that or take position no deny extended deadline?

8:51:00 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Agree with latter?

8:51:09 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Testimony was wrong?

8:51:16 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Section 19, allows utilities ask for declaratory ruling?

8:51:30 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Have 21 days to do so?

8:51:36 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Request was made in Dec 2022, 21 days run?

8:51:54 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Know whether KCA filed response?

8:52:15 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace KCA Response, Companies Request 2, responding witness, correct?

8:52:55 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Have served as expert witness for life, serving as expert witness?

8:53:23 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Identify dozens of instances provided expert witness services?

8:53:37 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Data Request 2 asked to identify any instances supported or advocated for construction natural gas fired generating unit?

8:54:05 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Straight forward question?

8:54:12 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Response analyst and not advocate?

8:54:26 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Grad school experience?

8:54:36 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Not see where directly answered question?

8:55:45 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Offering opinions about construction or acquisition of gas-fired?

8:56:02 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace In this case, main issue whether companies should construct gas-fired generating units?

8:56:26 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Are advocating for anything in this case?

8:56:45 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace First time serving in advocacy role?

8:57:09 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Advocating that position?

8:57:27 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Analyst not advocate, position advocating in this case?

8:57:48 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace What was bad choice of words?

8:57:57 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Page 4, line 10, references to testimony, whether accurate, page 4, line 10, premature construct NGCCs?

8:58:51 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Opinion?

8:58:58 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Line 13, page 4, position customers well served by delay?

8:59:14 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Page 14, line 8, position investment in NGCCs be delayed?

8:59:54 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Page 11, line 4, take position four PPAs not be approved?

9:00:00 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Page 11, line 9, Brown be rejected, page 13, line 14, position Good Neighbor Rule delayed, modified, appealed CPCN reconsidered?

9:00:54 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Page 30, line 1, position carbon capture or hydrogen coal firing in analysis?

9:01:26 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Opinion?

9:01:32 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Page 52, line 12, recommendation buyout options?

9:01:53 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Examples taken a position, made recommendation?

9:02:12 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Advocated for those things?

9:02:19 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Commission ought to follow opinion?

9:02:44 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Understanding of requirement satisfy CPCN so NGCCs be approved?

9:03:14 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Without SB-4?

9:03:23 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Part of consideration least cost reasonable solution?

9:03:40 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace What are other?

9:05:21 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Lot of opinions, Commission should follow?

9:05:45 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace In all experience, never advocated for construction of NGCC?

9:06:01 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Sierra Club in this case?

9:06:09 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Whether has legal obligation to serve customers?

9:06:18 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace KCA in this case?

9:06:24 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Whether has obligation to provide reliable service?

9:06:43 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Companies in this case have obligation to serve?

9:06:54 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Familiar who members are KCA?

9:07:01 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Alliance Coal?

9:07:05 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Muhlenberg County Coal?

9:07:08 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Companies paid to Alliance \$1.2 billion?

9:07:10 AM Atty Ingram KU/LG&E - witness Medine
Note: Sacre, Candace Paid to Muhlenberg Coal over \$481 million?

9:07:20 AM Chairman Chandler
Note: Sacre, Candace Ms. Vinsel, Mr. Bellamy?

9:07:45 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Cross Examination. Page 5 rebuttal, line 17, Good Neighbor Plan, indicate proposed rule differs, ways differ?

9:08:54 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Page 28, line 10, how done differently, reading, (click on link for further comments), testimony regarding analysis over 30-year period, opinion time period determine rate effects on customers?

9:10:57 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Why ten years?

9:11:49 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Earlier said residential rate analysis?

9:12:12 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Only look at residential, agree only effect on subset of customers?

9:12:51 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace What rate impact study show that present value revenue requirement not show?

9:14:14 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Examination. Current rates reflect cost current facilities?

9:14:40 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Present value revenue requirement not show rate impact of double, already reflect initial investment?

9:14:58 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Get appreciation what Incremental cost be?

9:15:47 AM Chairman Chandler
Note: Sacre, Candace Mr. Bellamy?

9:15:50 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Cross Examination (cont'd). Talking about analysis, is that in Table E-4 direct?

9:16:18 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Confirm what referring to?

9:16:36 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Page 26, line 18, higher than actual coal paid in first quarter 2023, \$2.30 based on EIA data?

9:17:32 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Using EIA data projected gas price lower also?

9:18:26 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Gas prices more volatility than coal?

9:18:47 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Over long term, if use average, volatility both up and down accounted for?

9:21:46 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Method advocating explain how projected coal prices?

9:22:03 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Done that independently, EIA data?

9:22:55 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Asked prepare projections coal prices?

9:23:23 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Agree method used in IRP correct method?

9:24:00 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Wilson testified if looked difference projected coal prices and gas prices consistent with ratio projected here?

9:25:09 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Five-year contracts, usual get contract beyond that period?

9:25:48 AM Asst Gen Counsel Bellamy PSC - witness Medine
Note: Sacre, Candace Suppliers give contracts, typical contract?

9:26:18 AM Chairman Chandler
Note: Sacre, Candace Vice Chair?

9:26:20 AM Chairman Chandler
Note: Sacre, Candace Commissioner?

9:26:33 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Examination. Assertion in testimony, Page 36, question, reading, (click on link for further comments), response, reading, (click on link for further comments), right?

9:27:43 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Comments of commissioners and president NERC?

9:28:08 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Highlighted test?

9:28:16 AM Chairman Chandler - witness Medine
Note: Sacre, Candace ESM-4, testimony U S Senate in May, reading, (click on link for further comments), going to Christy comments, reading, (click on link for further comments), comments Robb month later, reading, (click on link for further comments), agree concern around marketplaces and wholesale power markets?

9:32:19 AM Chairman Chandler - witness Medine
Note: Sacre, Candace MISO almost exclusively vertically integrated?

9:32:31 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Other than Illinois?

9:32:39 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Kentucky, Missouri, Louisiana, Arkansas, Mississippi, Indiana, Michigan, all those vertically integrated, the Dakotas?

9:33:12 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Comments lean heavily on market issues?

9:33:18 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Take away from comments and your testimony, reread lines 20 through 21, reading, (click on link for further comments), given citations and your concern replacement, proposal in this case inconsistent with needs commissioners noting?

9:34:34 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Replacing with same dispatchable resources retiring?

9:35:00 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Whether been delay with EKE?

9:35:22 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Issues with building/converting power plants?

9:35:49 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Bringing back coal plant?

9:36:22 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Least cost most reasonable?

9:36:38 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Aware environmental compliance costs CPCN compared to?

9:37:02 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Read through testimonies retired generators not being replaced, case here?

9:37:53 AM Chairman Chandler - witness Medine
Note: Sacre, Candace Commissioners not talking about costs at all?

9:38:41 AM Chairman Chandler
Note: Sacre, Candace Mr. Malone?

9:38:47 AM Atty Malone KCA - witness Medine
Note: Sacre, Candace Redirect Examination. Said gas when meant coal market dynamics, differences strategies coal and gas?

9:40:04 AM Atty Malone KCA - witness Medine
Note: Sacre, Candace Discussion about SB-4, adverse impact, reliability, and resources, anything tell Commission?

9:40:45 AM Chairman Chandler
Note: Sacre, Candace Procedural discussion. (Click on link for further comments.)

9:41:41 AM Chairman Chandler
Note: Sacre, Candace Recess until 9:55.

9:41:53 AM Session Paused

10:05:54 AM Session Resumed

10:06:04 AM	Chairman Chandler Note: Sacre, Candace	Back on the record.
10:06:26 AM	Chairman Chandler Note: Sacre, Candace	Status of witnesses. (Click on link for further comments.)
10:06:43 AM	Chairman Chandler Note: Sacre, Candace	Mr. Childers?
10:06:46 AM	Atty Childers Sierra Club Note: Sacre, Candace	Andrew Levitt.
10:06:50 AM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
10:06:58 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Examination. Name and address?
10:07:22 AM	Atty Childers Sierra Club - witness Levitt Note: Sacre, Candace	Direct Examination. Cause direct testimony be filed?
10:07:30 AM	Atty Childers Sierra Club - witness Levitt Note: Sacre, Candace	Sponsor responses?
10:07:34 AM	Atty Childers Sierra Club - witness Levitt Note: Sacre, Candace	Corrections?
10:07:52 AM	Atty Childers Sierra Club - witness Levitt Note: Sacre, Candace	Testimony true and correct?
10:07:56 AM	Atty Childers Sierra Club - witness Levitt Note: Sacre, Candace	Were to provide same testimony today, answers be same?
10:08:12 AM	Chairman Chandler Note: Sacre, Candace	Questions?
10:08:22 AM	Chairman Chandler Note: Sacre, Candace	Mr. Kurtz?
10:08:24 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Cross Examination. Page 7 of testimony, RTO study, Guidehouse study, five times?
10:09:18 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Challenging results of study?
10:09:26 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Guidehouse study looked at status quo situation versus joining PJM as FRR entity?
10:09:54 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	When convert from FRR to RPM?
10:10:04 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	How know converted?
10:10:25 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Looked at companies on standalone basis, converted to RPM sometime during that study?
10:10:59 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Buying capacity from PJM before converting to FRR?
10:11:13 AM	Atty Kurtz KIUC Note: Sacre, Candace	Marked as KIUC 2, excerpts from Guidehouse study.
10:11:40 AM	Chairman Chandler Note: Sacre, Candace	Marked as KIUC 2.
10:11:41 AM	MARKED - KIUC HEARING EXHIBIT 2 Note: Sacre, Candace Note: Sacre, Candace	ATTY KURTZ KIUC - WITNESS LEVITT 2022 RTO MEMBERSHIP ANALYSIS NOVEMBER 2022 UPDATED MAY 2023 EXERPTS FROM GUIDEHOUSE STUDY
10:12:06 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Cross Examination (cont'd). Have KIUC 2 in front of you?

10:12:23 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	On Table 4, did capacity expansion plan assumed companies would do standalone basis?
10:13:04 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Table 5, Guidehouse plan under PJM FRR scenario?
10:13:33 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	For FRR, provide own bricks and mortar opposed buying capacity through market?
10:13:55 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Has to be dedicated unit?
10:14:07 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Rather than relying on auctions?
10:14:17 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Allowed sell into market, talking about buying?
10:14:34 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Companies join PJM, Guidehouse assumed 1,852 megawatts combined cycle additions 1300 megawatts CTs 700 megawatts battery storage 1,950 megawatts new solar 100 megawatts new wind under PJM scenario?
10:15:08 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Excerpt from testimony, marked as KIUC 3.
10:15:30 AM	Chairman Chandler Note: Sacre, Candace	So marked.
10:15:31 AM	MARKED - KIUC HEARING EXHIBIT 3 Note: Sacre, Candace Note: Sacre, Candace	ATTY KURTZ KIUC - WITNESS LEVITT TABLE 4 JOINING PJM YIELDS INVESTMENT SAVING OF \$130 - \$140 MILLION ANNUALLY STARTING IN 2028
10:15:59 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Cross Examination (cont'd). Summary of analysis?
10:16:15 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Lines 1-5, stand-alone companies versus joins PJM lines 6-12, correct?
10:16:43 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Line 2, status quo, utilities assume 6,790 megawatts capacity?
10:16:58 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	2050, 32 years later, projecting still own 6,647 megawatts capacity?
10:17:42 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Total capacity expecting to have, lots of retirements, lots of replacements?
10:18:04 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Basis of testimony, retiring four units?
10:18:24 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Sierra Club 2, same document, show all Ghent units retired by 2037?
10:19:42 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Confirm SC Exhibit 2 shows all Ghent units retired by 2037?
10:20:09 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Same exhibit shows book value at retirement, also shows Ghent units retiring 2037?
10:21:13 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Line 7, 2050 under PJM membership, assuming 6,429 megawatts still be in operation?
10:22:02 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Reasonable all coal plants still in operation in 2050 joins PJM?

10:22:26 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Line 10, utilities still own 6,429 megawatts capacity, need 6,780 MW less 56 MW, need 407 MW purchase?
10:23:00 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Assuming clearing price \$72 dollars MWd?
10:23:10 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	In 2050, able buy 407 MW capacity for \$11 million?
10:23:26 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Capacity be inexpensive in 27 years?
10:24:19 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Rejected Guidehouse study all other respects?
10:24:32 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Believe capacity pricing \$2.19 KWm?
10:25:03 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Economist?
10:25:07 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Agree long-term capacity price be net CONE long run marginal cost or cost of new entry less ancillary and energy revenues net CONE?
10:25:55 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Know what PJM estimate net CONE today?
10:26:28 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Why anybody build power plan if could buy it \$75 MWd?
10:26:49 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Agree nobody build power plant that cheap, why any load-serving entity build power plant if buy so inexpensively?
10:28:16 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Here when Chairman reading NERC?
10:28:35 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Capacity pricing so cheap, not incentivize?
10:29:14 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Christy testimony PJM not market, what read not go to what I'm saying, in your study, Guidehouse study, included cost of being member of PJM?
10:29:47 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Where costs in your study?
10:30:21 AM	Atty Kurtz KIUC Note: Sacre, Candace	Mark as KIUC 4.
10:30:38 AM	Chairman Chandler Note: Sacre, Candace	So marked as KIUC 4.
10:30:39 AM	MARKED - KIUC HEARING EXHIBIT 4 Note: Sacre, Candace Note: Sacre, Candace	ATTY KURTZ KIUC - WITNESS LEVITT 2022 RTO MEMBERSHIPS ANALYSIS LG&E/KU PPL COMPANIES NOVEMBER 2022 UPDATED MAY 2023 3.3 COSTS AND BENEFITS ANALYZED
10:31:08 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Cross Examination (cont'd). Recognize this as portion of Guidehouse study?
10:31:26 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Include cost of being member on Table 4?
10:31:36 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Not free?
10:31:44 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Page 16, Exhibit 4, RTO administrative fee?

10:31:59 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	\$19.2 million?
10:32:04 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	In 2022-2023 dollars?
10:32:32 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Uplift charges?
10:33:15 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	RTEP expansion costs?
10:33:21 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	What are they?
10:33:24 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Big ticket costs socialized among all members?
10:33:53 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	When New Jersey building wind, socialized through RTEP?
10:34:31 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	None of costs make way to other PJM members?
10:34:51 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	State opposite other day, what about when coal plants retire and solution reliability build replacement?
10:35:19 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Increasing cost going forward?
10:36:02 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Be additional costs coal plants retiring?
10:36:12 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Estimates costs \$17.8 million to \$20.5 million per year?
10:36:28 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Fees and RTEP not included any assumed costs in study?
10:37:01 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Why recommend Commission relying on analysis if not complete?
10:39:13 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Testimony done preliminary capacity savings but not full cost, companies redo entire study?
10:40:03 AM	Atty Kurtz KIUC - witness Levitt Note: Sacre, Candace	Realize Commissioners make decision by Nov?
10:40:18 AM	Chairman Chandler Note: Sacre, Candace	Mr. Ingram?
10:40:28 AM	Atty Ingram KU/LG&E - witness Levitt Note: Sacre, Candace	Cross Examination. What said about testimony not recommend join PJM?
10:41:14 AM	Atty Ingram KU/LG&E - witness Levitt Note: Sacre, Candace	Attempted perform analysis what net cost be if join PJM?
10:42:21 AM	Atty Ingram KU/LG&E - witness Levitt Note: Sacre, Candace	Page 7, Table 1, top of page, benefits of joining PJM, read table summary of benefits, if join PJM capacity savings of \$900-\$1300 cost savings reduced capacity need and savings of production costs \$70 million, high level benefits?
10:43:46 AM	Atty Ingram KU/LG&E - witness Levitt Note: Sacre, Candace	Page 9, Figure 2, further detail on capacity savings if joined PJM?
10:44:13 AM	Atty Ingram KU/LG&E - witness Levitt Note: Sacre, Candace	Page 20, Figure 5, benefit reduced reserve margin requirement?
10:44:41 AM	Atty Ingram KU/LG&E - witness Levitt Note: Sacre, Candace	Page 24, Table 2, net capacity savings result if join PJM 1267 megawatts?

10:45:20 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Page 31, Table 4, same Kurtz showed you, summary of investment savings achieve joining PJM \$130-\$140 million savings a year?

10:46:12 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace When performed calculations, done to current capacity construct?

10:46:26 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Page 28, line 390, made early stage proposal seasonal capacity?

10:46:52 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace If proposal moves forward and capacity construct changes, affect all tables went through?

10:47:19 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace In response Q 12, all figures change, know how much change?

10:47:46 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace In career, supported construction of natural gas fired unit?

10:48:04 AM Atty Childers Sierra Club
Note: Sacre, Candace Inconsistent with Sierra Club position? (Click on link for further comments.)

10:48:26 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Reviewed Sinclair testimony?

10:49:05 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Recall Sinclair Page 34 not adverse joining RTO just must finish in money?

10:49:35 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Do so if net benefit to customers?

10:49:51 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Agree with philosophy?

10:49:57 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Discussion reading Haque?

10:50:09 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Remarks to Ky General Assembly, familiar?

10:50:30 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Supply crunch?

10:50:37 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Thermal resources until replacement tech exists?

10:51:09 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Employed by PJM?

10:51:18 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Left in 2022?

10:51:25 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace When?

10:51:28 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Elliott six or seven months after left?

10:52:02 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace PJM press release, issued Dec 23 2022, document look familiar?

10:52:31 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Aware PJM issued press release?

10:52:54 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace See third paragraph asking customers reduce electricity?

10:53:10 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Also indicates continues to monitor?

10:53:41 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace On behalf of City of L'ville, City of Lexington, and Sierra Club?

10:53:47 AM Atty Ingram KU/LG&E - witness Levitt
Note: Sacre, Candace Who has legal obligation provide service?

10:53:59 AM	Atty Ingram KU/LG&E - witness Levitt Note: Sacre, Candace	Lexington does not?
10:54:05 AM	Atty Ingram KU/LG&E - witness Levitt Note: Sacre, Candace	Louisville does not?
10:54:09 AM	Atty Ingram KU/LG&E - witness Levitt Note: Sacre, Candace	Sierra Club does not?
10:54:20 AM	Atty Ingram KU/LG&E - witness Levitt Note: Sacre, Candace	Companies have obligation?
10:54:33 AM	Chairman Chandler Note: Sacre, Candace	Intend introducing KIUC 2, 3, and 4?
10:54:43 AM	Chairman Chandler Note: Sacre, Candace	Objection?
10:54:44 AM	KIUC HEARING EXHIBIT 2 Note: Sacre, Candace Note: Sacre, Candace	ATTY KURTZ KIUC - WITNESS LEVITT 2022 RTO MEMBERSHIP ANALYSIS NOVEMBER 2022 UPDATED MAY 2023 EXERPTS FROM GUIDEHOUSE STUDY
10:54:45 AM	KIUC HEARING EXHIBIT 3 Note: Sacre, Candace Note: Sacre, Candace	ATTY KURTZ KIUC - WITNESS LEVITT TABLE 4 JOINING PJM YIELDS INVESTMENT SAVING OF \$130 - \$140 MILLION ANNUALLY STARTING IN 2028
10:54:46 AM	KIUC HEARING EXHIBIT 4 Note: Sacre, Candace Note: Sacre, Candace	ATTY KURTZ KIUC - WITNESS LEVITT 2022 RTO MEMBERSHIPS ANALYSIS LG&E/KU PPL COMPANIES NOVEMBER 2022 UPDATED MAY 2023 3.3 COSTS AND BENEFITS ANALYZED
10:54:58 AM	Chairman Chandler Note: Sacre, Candace	Ms. Vinsel?
10:55:02 AM	Chairman Chandler Note: Sacre, Candace	Vice Chair?
10:55:05 AM	Chairman Chandler Note: Sacre, Candace	Commissioner?
10:55:07 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Examination. Dealt with IEEE Standards before?
10:55:13 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	How about IEEE 47?
10:55:46 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Old solar, new solar as relates to responding to dispatch from RTOs?
10:56:28 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Inverter based resources?
10:56:44 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Distinction between dispatchability?
10:58:48 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Asked Sinclair reserve margin in PJM, talked about quite a bit?
10:59:06 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Differences RTO lower?
10:59:22 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Compare margins?
10:59:38 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Does BRA clear reserve margin?
10:59:50 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Why?
11:00:19 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Read Wilson testimony?

11:00:27 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Steps DSM, battery add reliability at low cost?

11:00:38 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Cheap reliability?

11:00:59 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Do you know what reserve margin in 2023-2024 BRA was?

11:01:11 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Surprised if 20.3 percent?

11:01:39 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace If 14.8 percent target reserve margin LOLE one in every ten years, know LOLE of a 20.3 percent reserve margin in '23-'24 delivery year?

11:02:31 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace See URLPJM.com?

11:02:35 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace 2022 PJM Reserve Requirement Study?

11:02:50 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Familiar?

11:02:55 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Page 70, Appendix B, see that?

11:03:12 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Reserve modeling sensitivity ratings, see what RI is there?

11:03:29 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace What RI mean?

11:03:33 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Clearing price is equivalent of one in 149.2 year LOLE?

11:04:04 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Difference between 14.8 percent actually clear 20.3 percent one LOLE every 1.2 million hours?

11:04:46 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace 15 times one in ten?

11:05:04 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace If capacity market clearing, in excess reserve margin, why study reserve margin for analysis?

11:07:03 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace More or less equilibrium clearing price?

11:08:04 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace If company adequate reserve margin, matter whether participate as FRR or BRA entity when doing capacity calculations?

11:08:28 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace If not net purchaser in market?

11:08:48 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Leaning on capacity market?

11:09:07 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Reliability backstop?

11:09:17 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Reasonable assume vertically integrated facility adequate what clears at, difference between FRR or BRA member?

11:09:49 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Duke FRR member, come up with power meet FRR plan?

11:10:11 AM Chairman Chandler - witness Levitt
Note: Sacre, Candace Difference for utility FRR plan 20.3 percent or sold in and bought back at a 20.3 reserve margin?

11:11:07 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Clears at target reserve margin?
11:11:24 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Capacity market difference?
11:11:52 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Keep it or sell it?
11:12:00 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Reasonable assume FRR or BRA or study both?
11:12:56 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Is own LSE and continues retire generators and depends on market for capacity, reduction of generation risk higher capacity prices because of changes in CETEL values?
11:14:00 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Pay higher clearing price what buy back but get benefit of that price as well?
11:14:54 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Distinction between FRR and BRA participant if zone breaks out?
11:15:22 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Transmission capacity limits, expected future needs, FRR or BRA, items should be considered RTO analysis?
11:16:05 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Need for generation in future?
11:17:34 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Aware PJM manual changes in last five or six years outside RTO?
11:18:29 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Assume said no interest in allowing vertically integrated utilities depend on capacity markets, integrated resource plan, what portions of RTO study would that affect?
11:20:12 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Having MW capacity cleared market PJM buying or owning generation of megawatt, difference to utility?
11:20:48 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Owning market sets hedge?
11:20:58 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Owens no capacity, PJM buys for them, not get right to energy produced?
11:21:20 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Just paying what load LMP is?
11:21:31 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	If own generation, as long as not short, what producing maximum pay?
11:21:53 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Sell in at LMP and buy back at LMP but cost whatever megawatt hour production cost is?
11:21:57 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Risk to customers being short?
11:22:35 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	If 100 MW short, sold in bought back, portion not own, max pay cost short, agree?
11:23:20 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Risk to customers has to be accounted for in study?
11:24:01 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	\$72 MWh Guidehouse amount 2050?

11:24:21 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Some marginal resource, make so much in market, only needs give \$72?
11:24:37 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	If requires utility joins PJM, input cost when drops below requirement, drop in gross CONE new generator, always be less than net CONE of equilibrium capacity market?
11:25:14 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Create savings?
11:25:25 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	One study of buying capacity at capacity market, other study gross CONE, create savings?
11:26:40 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Benefit of having hedge, not be accounted for end-to-end determination?
11:27:22 AM	Chairman Chandler - witness Levitt Note: Sacre, Candace	Neither contemplated that degree of detail?
11:28:06 AM	Chairman Chandler Note: Sacre, Candace	Mr. Childers, redirect?
11:28:22 AM	Chairman Chandler Note: Sacre, Candace	Mr. Childers?
11:28:25 AM	Atty Childers Sierra Club Note: Sacre, Candace	Michael Goggin.
11:28:41 AM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
11:28:48 AM	Chairman Chandler - witness Goggin Note: Sacre, Candace	Examination. Name and address?
11:29:06 AM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Direct Examination. Cause direct testimony be filed?
11:29:13 AM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Also cause responses be filed?
11:29:21 AM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Changes or corrections?
11:29:29 AM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Provide testimony today, answers be same?
11:29:38 AM	Chairman Chandler Note: Sacre, Candace	Questions?
11:29:55 AM	Chairman Chandler Note: Sacre, Candace	Mr. Kurtz?
11:29:58 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Cross Examination. Page 14 of testimony, line 10, reading (click on link for further comments), market forces take care concerns fossil retirements?
11:32:00 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Hear Chairman read statements from FERC?
11:32:27 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Why not order utility build new power plant?
11:33:38 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Reliability must run agreements?
11:33:50 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Keep running if agrees, neither PJM nor FERC nor MISO can order?
11:34:18 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Who PJM order build power plant?

11:35:12 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Under Federal Power Act, FERC not have jurisdiction?
11:35:18 AM	Atty Childers Sierra Club Note: Sacre, Candace	Objection, calls for legal conclusion. (Click on link for further comments.)
11:35:41 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Send price signals, cannot order plant be built?
11:36:11 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	When said send price signal build new power plant, higher capacity cost and higher rates for consumers, what means?
11:37:07 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	PJM signal have to overcome countervailing price?
11:38:13 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	PJM signal also overcome price signals by EPA 111 rules?
11:39:01 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Merchant generator take rules into account invest new plant or use capital?
11:39:48 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Any price signal PJM send result in new coal power plant?
11:40:31 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Aware in Kentucky obligation serve reliably and adequate service regardless what PJM sending?
11:41:00 AM	Atty Kurtz KIUC - witness Goggin Note: Sacre, Candace	Market for power plants different than market for pork bellies?
11:41:10 AM	Chairman Chandler Note: Sacre, Candace	Mr. Crosby?
11:41:17 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Cross Examination. Home because of childcare reasons?
11:42:03 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Experience, energy industry 15 years?
11:42:33 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Indicated not advocated any fossil-fired unit?
11:43:21 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Testimony available?
11:43:28 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Line 9, page 15, see that?
11:43:51 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Analysis more input capacity, not need build NGCC units?
11:44:26 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Page 15, line 14, companies' imports peak periods, see that?
11:44:44 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	17-18, imported power peak periods?
11:45:54 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Reviewed Sinclair?
11:46:13 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Not only in territory?
11:46:31 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Looking at data more than companies?
11:46:47 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Other entities serving load import power do so?
11:47:02 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	When say, Table, page 17, data presented her BA level data?
11:48:04 AM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Reviewed Sinclair?

11:48:13 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Have rebuttal available?

11:48:20 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Page 25, accept companies import data same hours 31 of 40 hours, see that?

11:49:12 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Input into data requests by Sierra Club?

11:49:31 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace How many?

11:49:34 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Accept four?

11:49:40 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Sierra Club could have requested?

11:49:59 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Your testimony, page 23, grid?

11:50:15 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Import values maximum hourly values EIA Form 930 data?

11:50:35 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Line bolded noncoinciden 4653 MW, just sum of preceding numbers?

11:50:59 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Describe that, lines 2-5 reading, (click on link for further comments), read correctly?

11:51:21 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Having read CV testimony, not electrical engineer?

11:51:39 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Not run transmission possible all imports be coming in simultaneously?

11:52:10 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Different implausible and impossible?

11:52:23 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Bottom, reading, (click on link for further comments), same data from table page 17?

11:53:11 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Willing accept actual imports during same hour Sinclair rebuttal page 25 less than half 676 MW?

11:54:00 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Know what OVEC is?

11:54:16 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Rights to serve OVEC and import as needed?

11:54:25 AM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Resource accounted for?

11:55:05 AM Chairman Chandler
Note: Sacre, Candace Recess until 12:35.

11:55:17 AM Session Paused

12:47:23 PM Session Resumed

12:47:37 PM Chairman Chandler
Note: Sacre, Candace Back on the record.

12:47:39 PM Chairman Chandler
Note: Sacre, Candace Witness excused. (Click on link for further comments.)

12:47:49 PM Chairman Chandler
Note: Sacre, Candace Mr. Crosby?

12:48:00 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Cross Examination (cont'd). Share screen, see that?

12:48:22 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Page 9, lines 7 -8, reading (click on link for further comments), is that correct?

12:48:48 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Show you what represent to you copy of comments ERCOT, MISO, PJM, and SPP, seen before?

12:49:22 PM Atty Childers Sierra Club
Note: Sacre, Candace Objection, not opportunity review. (Click on link for further comments.)

12:49:57 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Cross Examination (cont'd). Understanding not review this, aware of EPA rulemaking greenhouse gas emissions new and existing electric generating units?

12:50:26 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace No reason doubt comments filed?

12:51:17 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Want to show you same document, Page 12, see sentence, reading, (click on link for further comments), read accurately?

12:52:26 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Show you purports to be appendix to comments, Page 20, see figure, seen before?

12:53:07 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Aware MISO capacity situation?

12:53:25 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Reading, (click on link for further comments), see text?

12:54:28 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Appendix 3 purports to be from PJM, familiar with graphics?

12:54:54 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Might be familiar with that?

12:55:12 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Let me show you PJM document sent earlier today, see in text, reading (click on link for further comments), title sound familiar?

12:55:52 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Does this look familiar to you?

12:56:10 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Page 2 of document, graphic look similar?

12:56:34 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Able to verify a PJM document?

12:56:55 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Bar chart, reading, (click on link for further comments), see that?

12:58:23 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace PJM document speaks for itself?

1:00:01 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace See last sentence, reading, (click on link for further comments)?

1:00:48 PM Atty Childers Sierra Club
Note: Sacre, Candace Object again, counsel testifying. (Click on link for further comments.)

1:01:33 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Cross Examination (cont'd). Reason to dispute sentence just read?

1:02:26 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace Rely on in time of need TVA?

1:04:03 PM Atty Crosby KU/LG&E - witness Goggin
Note: Sacre, Candace States, Page 14, lines 3-6, reading, (click on link for further comments), respect Cumberland Fossil plant aware Sierra Club seek enjoin construction?

1:05:11 PM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Aware of Tennessee chapter protest construction of pipeline serve Kingston Fossil plant?
1:05:30 PM	Atty Childers Sierra Club Note: Sacre, Candace	Objection. (Click on link for further comments.)
1:05:51 PM	Atty Crosby KU/LG&E - witness Goggin Note: Sacre, Candace	Cross Examination (cont'd). Correct me if wrong count on capacities stating to Commission unaware Sierra Club enjoin construction?
1:07:22 PM	Atty Crosby KU/LG&E Note: Sacre, Candace	Move for introduction of exhibits. (Click on link for further comments.)
1:08:08 PM	Chairman Chandler Note: Sacre, Candace	Hearing Exhibit 1, RTO covenants?
1:08:27 PM	Chairman Chandler Note: Sacre, Candace	Second one PJM FRR Report, February 24 2023.
1:08:45 PM	Atty Childers Sierra Club Note: Sacre, Candace	Object, no foundation. (Click on link for further comments.)
1:08:46 PM	KU/LG&E HEARING EXHIBIT 2 Note: Sacre, Candace Note: Sacre, Candace	ATTY CROSBY KU/LG&E - WITNESS GOGGIN PJM FRR REPORT FEBRUARY 24 2023
1:13:26 PM	Chairman Chandler Note: Sacre, Candace	Admitted KU/LG&E 2, did not admit KU/LG&E 1. (Click on link for further comments.)
1:13:42 PM	Chairman Chandler Note: Sacre, Candace	Anything else?
1:13:52 PM	Chairman Chandler Note: Sacre, Candace	Ms. Vinsel, Mr. Bellamy?
1:13:54 PM	Asst Gen Counsel Bellamy PSC - witness Goggin Note: Sacre, Candace	Cross Examination. Page 29, scroll down to page 30, line 18, Astrape report, reading, (click on link for further comments)?
1:14:51 PM	Asst Gen Counsel Bellamy PSC - witness Goggin Note: Sacre, Candace	Page 31, line 9, reading, (click on link for further comments), not see where talked about capacity value assigned to coal units, anywhere else?
1:16:42 PM	Asst Gen Counsel Bellamy PSC - witness Goggin Note: Sacre, Candace	Criticisms both coal and gas amount, same amount or different opinion treatment of gas and coal?
1:18:33 PM	Asst Gen Counsel Bellamy PSC - witness Goggin Note: Sacre, Candace	Fuel supply issue more likely occur with gas?
1:19:07 PM	Asst Gen Counsel Bellamy PSC - witness Goggin Note: Sacre, Candace	Page 30, line 18, differences between PJM and LG&E balancing area lead to different results in LG&E balancing area?
1:22:42 PM	Asst Gen Counsel Bellamy PSC - witness Goggin Note: Sacre, Candace	Geographic diversity PJM, size compared to balancing area, possible do analysis correlated outages within balancing area?
1:23:56 PM	Asst Gen Counsel Bellamy PSC - witness Goggin Note: Sacre, Candace	Specific capacity value recommending or specific analysis thought should have been done?
1:25:18 PM	Asst Gen Counsel Bellamy PSC - witness Goggin Note: Sacre, Candace	Back to ELCC, when said not make recommendation coal, way modeling done if decrease capacity value natural gas CC and not coal, affect more negative manner select coal units?
1:27:12 PM	Asst Gen Counsel Bellamy PSC - witness Goggin Note: Sacre, Candace	What ELCC capture that forced outage rate not capture?

1:29:06 PM Asst Gen Counsel Bellamy PSC - witness Goggin
Note: Sacre, Candace Page 24, line 18, advocating for batteries use capacity value of hundred percent?

1:30:46 PM Asst Gen Counsel Bellamy PSC - witness Goggin
Note: Sacre, Candace What hundred percent capacity value look like to you, charging and discharging 100 MW four hours a day?

1:31:50 PM Chairman Chandler
Note: Sacre, Candace Vice Chair?

1:31:51 PM Chairman Chandler
Note: Sacre, Candace Commissioner?

1:31:56 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Examination. Who in America build own operate energy-producing facilities?

1:32:18 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Generation across U S retired?

1:32:58 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace What purpose of talking TVA's plan?

1:33:48 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Believe geographic diversity, entire Eastern, reserve margin in excess of zero megawatts?

1:35:39 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Disagree with MISO and PJM expectation resource adequacy, glut of power in RTOs?

1:37:15 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace MISO prompt market?

1:37:19 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Two- or three-month price signal before delivery year?

1:37:33 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Capacity markets MISO cleared at CONE?

1:37:48 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Sufficiency of generation?

1:38:15 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Agree market prices last year indicate not sufficiency?

1:38:36 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Reliability backstop, RMR not available under FERC for resource adequacy?

1:39:10 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Can be?

1:39:20 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace PJM had sufficient capacity not used reliability backstop?

1:39:35 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace Won't know until prices tell us?

1:40:03 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace What happens not sufficient capacity, what happens clearing price?

1:40:21 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace What indicate when clearing price gets close to CONE or net CONE?

1:40:53 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace If join PJM, at what point prices rise high enough build generation?

1:41:33 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace What distinguishes them from being merchant generator?

1:42:25 PM Chairman Chandler - witness Goggin
Note: Sacre, Candace If analysis build or not based off energy, ancillary services, and capacity market revenues, what difference vertically integrated utility or hedge fund or whoever else backing?

1:43:35 PM	Chairman Chandler - witness Goggin Note: Sacre, Candace	In lieu of building generation or buying power, join PJM?
1:44:49 PM	Chairman Chandler - witness Goggin Note: Sacre, Candace	Somebody else owns and operates generation?
1:45:09 PM	Chairman Chandler - witness Goggin Note: Sacre, Candace	Someone has to generate electricity regardless of capacity?
1:45:30 PM	Chairman Chandler - witness Goggin Note: Sacre, Candace	Does acknowledging existence of additional headroom negate need for vertically integrated utility have capacity to meet retail load?
1:46:38 PM	Chairman Chandler Note: Sacre, Candace	Mr. Childers?
1:46:41 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Redirect Examination. Did you review Sinclair exhibit DSS-3 shows additional resources in PJM queue?
1:47:02 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Have Sinclair testimony available?
1:47:16 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Notice DSS-3 significant additional resources?
1:47:32 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Also show 34 GW battery storage?
1:47:40 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Batteries dispatchable?
1:47:48 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Batteries dispatched more quickly than gas?
1:47:58 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	More quickly than coal resources?
1:48:38 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	See PJM 150 GW nameplate solar?
1:48:49 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Solar dispatched zero to nameplate when available?
1:49:17 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	PJM queue 40 GW nameplate wind?
1:49:25 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Fair to say more capacity PJM queue than projection of potential retirements?
1:49:48 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Table on page 17 of testimony, compare to table Sinclair testimony page 25?
1:50:02 PM	Atty Childers Sierra Club - witness Goggin Note: Sacre, Candace	Clarification or explain discrepancy two tables?
1:51:31 PM	Chairman Chandler Note: Sacre, Candace	Witness excused.
1:51:38 PM	Chairman Chandler Note: Sacre, Candace	Anything else Sierra Club?
1:51:42 PM	Chairman Chandler Note: Sacre, Candace	Anything else Louisville and Lexington?
1:52:01 PM	Chairman Chandler Note: Sacre, Candace	Mr. Kurtz?
1:52:05 PM	Atty Kurtz KIUC Note: Sacre, Candace	Lane Kollen.
1:52:26 PM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
1:52:33 PM	Chairman Chandler - witness Kollen Note: Sacre, Candace	Examination. Name and address?

1:52:51 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Direct Examination. Document marked direct testimony?
1:52:57 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Prepared by you?
1:53:00 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Ask same questions, answers be same?
1:53:04 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Changes or corrections?
1:53:09 PM	Chairman Chandler Note: Sacre, Candace	Questions?
1:54:00 PM	Chairman Chandler Note: Sacre, Candace	Ten-minute recess.
1:54:19 PM	Session Paused	
2:05:08 PM	Session Resumed	
2:05:11 PM	Chairman Chandler Note: Sacre, Candace	Back on the record.
2:05:26 PM	Chairman Chandler Note: Sacre, Candace	Mr. Riggs?
2:05:33 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Cross Examination. More than 40 years experience?
2:05:51 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	In addition to industrial customers represented, 16 regulatory commissions in your career?
2:06:21 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Also represented 23 industrial or cooperative utilities?
2:06:42 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Appeared before this Commission?
2:06:51 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Appeared every KU/LG&E rate case since 1988?
2:07:06 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Presented positions KIUC or Atty General or both been adverse to companies?
2:07:16 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Know companies very well?
2:07:24 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Representation in this case includes company's largest customers and largest employers in Commonwealth?
2:07:42 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	With exception of Ghent 2, KIUC not oppose request retire other six units?
2:08:10 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Your position specific retirements comply with SB-4?
2:08:27 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	KIUC support MC 5 be built?
2:08:34 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Further position not oppose recommendation install Brown 12?
2:08:50 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Not oppose CPCN for Mercer Co solar or Marion Co solar?
2:09:00 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	KIUC not oppose DSM plan?
2:09:04 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Not oppose authorization establish regulatory asset?
2:09:31 PM	Atty Riggs KU/LG&E - witness Kollen Note: Sacre, Candace	Differences KIUC has four solar PPAs?

2:09:43 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace Basis comparison reliability an resiliency of retired units?

2:09:57 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace If company propose additional PPAs outside SB-4 case here, considerations do not apply?

2:10:39 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace First position, recommend in alternative purchase power expense not regarded fuel adjustment charge?

2:11:13 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace Why believe recovery through rate mechanism not appropriate?

2:13:22 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace Are there REQs associated with solar contracts?

2:13:44 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace If rider REQs be included?

2:13:55 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace Benefit to customers?

2:14:14 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace Ghent 2 keep open?

2:14:24 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace Page 15, present possible uses Ghent 2 not retired?

2:14:44 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace Recommendation page 14, line 11 and line 20, net present value penalty?

2:15:44 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace \$50 to \$60 million dollars a year net present value?

2:16:32 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace Keeping Ghent 2 open is not least cost optioin?

2:17:34 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace One of three possible uses Ghent 2, unit power sales to Kentucky Power?

2:18:25 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace Just an idea?

2:18:49 PM Atty Riggs KU/LG&E - witness Kollen
Note: Sacre, Candace Not possess evidence of Kentucky Power interest?

2:19:10 PM Chairman Chandler
Note: Sacre, Candace Mr. Bellamy, Ms. Vinsel?

2:19:17 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Examination. Every rate case since 1988?

2:19:43 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Do a lot of work for industrial customers?

2:20:00 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace You usually revenue requirements/specific issues witness, and Baron does rate design testimony?

2:20:46 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Have load factors?

2:20:55 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Use a lot of kWh?

2:21:08 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace PPA costs allocated on demand, benefit high/low passthrough customers?

2:22:17 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Trying to hold harmless residential class, highest load factors see lower cost allocation than if passed through FAC?

2:23:12 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Energy cost to company?

2:23:27 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Incentives?

2:23:38 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Understand economic incentive?

2:24:54 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Attempting remove risk FAC?

2:25:32 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Under precedent, \$40 number, understanding any given month recovery through FAC most expensive unit \$35, energy purchased at \$40 not recoverable as uneconomic?

2:26:20 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace At lowest amount?

2:26:26 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Not take place through tariff, already approved at that amount?

2:26:40 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Not giving more money, reducing risk?

2:27:22 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Would agree knowledge fuel adjustment clause?

2:27:51 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Many cases in Kentucky?

2:28:00 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Other jurisdictions?

2:28:48 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Any other states similar or same as Kentucky FAC or different?

2:30:28 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace PPAs set amount?

2:30:48 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Under current FAC, not incentive reduce volatility?

2:31:10 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace No economic incentive reduce volatility FAC?

2:31:29 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Not aware, pure economics pass through of cost, no cost sharing, nothing like that in Ky FAC?

2:31:59 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Price under PPA different all utilities incur fuel costs?

2:32:33 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace If someone concerned, removing less volatile fuel cost from FAC into another rider keep the volatility otherwise existed?

2:33:31 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace On a bill basis?

2:34:01 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Agreed not giving incentive but removing risk of disallowance?

2:34:22 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Aware Rockport power agreement?

2:34:31 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace That was PPA?

2:34:44 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Agree set up specifically provide utility serve customers not capital investment?

2:35:17 PM Chairman Chandler - witness Kollen
Note: Sacre, Candace Utility got incentive enter into PPA made them economically indifferent, \$6.2 million dollar annual return?

2:36:23 PM	Chairman Chandler - witness Kollen Note: Sacre, Candace	Not proposing additional incentive in lieu of investments?
2:36:44 PM	Chairman Chandler - witness Kollen Note: Sacre, Candace	Would you suggest that?
2:37:03 PM	Chairman Chandler - witness Kollen Note: Sacre, Candace	Result in utility paying cost of capital to developer and customers paying additional cost of capital to utility?
2:37:11 PM	Chairman Chandler Note: Sacre, Candace	Mr. Kurtz?
2:37:28 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Redirect Examination. Keeping Ghent 2 open through 2035, \$6.5 million of year?
2:37:52 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Small amount of money?
2:38:20 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Provide additional reliability?
2:38:41 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Cost through 2035 in Sinclair exhibit not include profits made from off-system sales?
2:39:10 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Could turn \$6.5 - \$7 million dollar cost per year into profit?
2:39:28 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Aware Jun 13 2023 Virginia issued an order in Dominion where treated solar PPAs on demand basis?
2:40:02 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	About to do same thing Appalachian Power in Virginia?
2:40:19 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	In between FAC total fuel volumetric obligation and demand obligation?
2:40:49 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Not think reasonable utility be at risk for disallowance solar PPA?
2:41:08 PM	Atty Kurtz KIUC - witness Kollen Note: Sacre, Candace	Remove disincentive?
2:41:18 PM	Chairman Chandler Note: Sacre, Candace	Mr. Kurtz, anything else?
2:41:35 PM	Chairman Chandler Note: Sacre, Candace	Mr. Cmar?
2:41:43 PM	Chairman Chandler Note: Sacre, Candace	First witness?
2:41:47 PM	Atty Cmar Joint Intervenors Note: Sacre, Candace	Andrew McDonald.
2:42:00 PM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
2:42:05 PM	Chairman Chandler - witness McDonald Note: Sacre, Candace	Examination. Name and address?
2:42:32 PM	Atty Cmar Joint Intervenors - witness McDonald Note: Sacre, Candace	Direct Examination. Have documents with you?
2:42:43 PM	Atty Cmar Joint Intervenors - witness McDonald Note: Sacre, Candace	Anything else?
2:42:47 PM	Atty Cmar Joint Intervenors - witness McDonald Note: Sacre, Candace	Cause testimony and answers be filed?
2:42:54 PM	Atty Cmar Joint Intervenors - witness McDonald Note: Sacre, Candace	Also cause be filed corrected testimony?

2:43:05 PM	Atty Cmar Joint Intervenors - witness McDonald Note: Sacre, Candace	Any corrections make today?
2:43:15 PM	Atty Cmar Joint Intervenors - witness McDonald Note: Sacre, Candace	Ask same questions, answers be same?
2:43:26 PM	Chairman Chandler Note: Sacre, Candace	Mr. Cook?
2:43:29 PM	Chairman Chandler Note: Sacre, Candace	Mr. Malone?
2:43:31 PM	Chairman Chandler Note: Sacre, Candace	Mr. Osterloh?
2:43:33 PM	Chairman Chandler Note: Sacre, Candace	Ms. Baxter?
2:43:36 PM	Chairman Chandler Note: Sacre, Candace	Ms. Grundmann?
2:43:37 PM	Chairman Chandler Note: Sacre, Candace	Mr. Kurtz?
2:43:39 PM	Chairman Chandler Note: Sacre, Candace	Ms. Wimberly?
2:43:42 PM	Asst Gen Counsel Bellamy PSC Note: Sacre, Candace	Staff has no questions.
2:43:45 PM	Chairman Chandler Note: Sacre, Candace	Vice Chair?
2:43:46 PM	Chairman Chandler Note: Sacre, Candace	Commissioner?
2:43:55 PM	Chairman Chandler Note: Sacre, Candace	Mr. Cmar?
2:43:56 PM	Atty Cmar Joint Intervenors Note: Sacre, Candace	Jim Grevatt.
2:44:00 PM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
2:45:00 PM	Chairman Chandler - witness Grevatt Note: Sacre, Candace	Examination. Name and address?
2:46:32 PM	Chairman Chandler Note: Sacre, Candace	Short recess.
2:46:50 PM	Session Paused	
2:50:36 PM	Session Resumed	
2:51:08 PM	Chairman Chandler - witness Grevatt Note: Sacre, Candace	Examination. Name and address?
2:51:31 PM	Atty Cmar Joint Intervenors - witness Grevatt Note: Sacre, Candace	Direct Examination. Where coming to us from?
2:51:44 PM	Atty Cmar Joint Intervenors - witness Grevatt Note: Sacre, Candace	What documents have with you?
2:52:13 PM	Atty Cmar Joint Intervenors - witness Grevatt Note: Sacre, Candace	Corrections?
2:53:01 PM	Atty Cmar Joint Intervenors - witness Grevatt Note: Sacre, Candace	Cause testimony and answers be filed?
2:53:14 PM	Atty Cmar Joint Intervenors - witness Grevatt Note: Sacre, Candace	Any other corrections?
2:53:20 PM	Atty Cmar Joint Intervenors - witness Grevatt Note: Sacre, Candace	Ask same questions, answers be same?
2:53:29 PM	Atty Cmar Joint Intervenors Note: Sacre, Candace	Procedural discussion. (Click on link for further comments.)
2:53:59 PM	Chairman Chandler Note: Sacre, Candace	Mr. Cook?

2:54:01 PM	Chairman Chandler Note: Sacre, Candace	Mr. Malone?
2:54:04 PM	Chairman Chandler Note: Sacre, Candace	Mr. Osterloh?
2:54:06 PM	Chairman Chandler Note: Sacre, Candace	Ms. Baxter?
2:54:08 PM	Chairman Chandler Note: Sacre, Candace	Ms. Grundmann?
2:54:10 PM	Chairman Chandler Note: Sacre, Candace	Mr. Kurtz?
2:54:13 PM	Chairman Chandler Note: Sacre, Candace	Ms. Wimberly?
2:54:20 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Cross Examination. Worked in utility industry 30 years?
2:55:30 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Energy Futures since 2013?
2:55:39 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Web site, given mission statement help transition to 100 percent renewable energy?
2:56:35 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt In 30 years experience, never once testified in favor of coal-fire or gas-fired unit?
2:56:57 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Not support even if least cost?
2:58:15 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Correct never supported fossil fuel generation over renewable?
2:59:09 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Questions how developed recommendation for DSM/EE, correct recommendations based on report prepared for Virginia utility, Pathways for Energy Efficiency?
3:00:53 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Table 12, direct, have in front of you?
3:01:00 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Page 61, several inputs to analysis beyond report, but report primarily used to develop Table 12?
3:02:08 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Study prepared to support meet standards of Clean Energy Act?
3:03:17 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Savings requirement in Kentucky?
3:04:01 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Include utilities in Kentucky?
3:05:26 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Comments other states implemented programs recommend, consider cost effectiveness of programs in other states?
3:06:33 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Confirm different states value inputs cost effectiveness differently?
3:07:02 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Correct never conducted type of cost effectiveness testing?
3:07:45 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Page 61, Table 12, detailed specifics any additional programs recommend achieve level of savings?
3:08:58 PM	Atty Wimberly KU/LG&E - witness Note: Sacre, Candace	Grevatt Understand testimony criticize not assessing cost effectiveness of 12 programs?

3:10:35 PM	Atty Wimberly KU/LG&E - witness Grevatt Note: Sacre, Candace	Aware did conduct cost effectiveness screenings on five programs?
3:11:39 PM	Atty Wimberly KU/LG&E - witness Grevatt Note: Sacre, Candace	Review Supplemental Response, Excel spreadsheet, result of analysis?
3:12:08 PM	Atty Wimberly KU/LG&E - witness Grevatt Note: Sacre, Candace	Two programs, strategic energy, and home energy, opinion further iteration of programs make result over one and cost effective?
3:13:15 PM	Atty Wimberly KU/LG&E - witness Grevatt Note: Sacre, Candace	Also make recommendations Commission file midplan update by date certain?
3:14:13 PM	Atty Wimberly KU/LG&E - witness Grevatt Note: Sacre, Candace	Review Isaacson testimony frequency programs come back and request modifications to programs?
3:14:56 PM	Atty Wimberly KU/LG&E - witness Grevatt Note: Sacre, Candace	If companies achieve savings identify, double what proposed, assert replace need for natural gas generation?
3:16:55 PM	Atty Wimberly KU/LG&E - witness Grevatt Note: Sacre, Candace	Confirm answer is no?
3:17:08 PM	Chairman Chandler Note: Sacre, Candace	Ms. Vinsel, Mr. Bellamy?
3:17:15 PM	Chairman Chandler Note: Sacre, Candace	Mr. Cmar?
3:17:31 PM	Chairman Chandler Note: Sacre, Candace	Mr. Cmar, next witness?
3:17:34 PM	Atty Cmar Joint Intervenors Note: Sacre, Candace	Anna Sommer.
3:17:50 PM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
3:17:57 PM	Chairman Chandler - witness Sommer Note: Sacre, Candace	Examination. Name and address?
3:18:15 PM	Atty Cmar Joint Intervenors - witness Sommer Note: Sacre, Candace	Direct Examination. Where coming from today?
3:18:31 PM	Atty Cmar Joint Intervenors - witness Sommer Note: Sacre, Candace	Which city?
3:18:58 PM	Atty Cmar Joint Intervenors - witness Sommer Note: Sacre, Candace	Anything else?
3:19:02 PM	Atty Cmar Joint Intervenors - witness Sommer Note: Sacre, Candace	Cause testimony and answers be filed?
3:19:11 PM	Atty Cmar Joint Intervenors - witness Sommer Note: Sacre, Candace	Corrections?
3:21:48 PM	Atty Cmar Joint Intervenors - witness Sommer Note: Sacre, Candace	All corrections?
3:22:03 PM	Atty Cmar Joint Intervenors - witness Sommer Note: Sacre, Candace	Ask same questions today, responses be same?
3:22:17 PM	Chairman Chandler Note: Sacre, Candace	Mr. Cook?
3:22:19 PM	Chairman Chandler Note: Sacre, Candace	Mr. Malone?
3:22:21 PM	Chairman Chandler Note: Sacre, Candace	Mr. Osterloh?
3:22:23 PM	Chairman Chandler Note: Sacre, Candace	Ms. Baxter?

3:22:26 PM	Chairman Chandler Note: Sacre, Candace	Ms. Grundmann?
3:22:28 PM	Chairman Chandler Note: Sacre, Candace	Mr. Kurtz?
3:22:30 PM	Chairman Chandler Note: Sacre, Candace	Mr. Crosby?
3:22:45 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Cross Examination. Table 6, page 32, before correction showing negative \$104 million, now positive \$81.9 million?
3:24:05 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Reading Exhibit AS-1 energy field 20 years?
3:24:25 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Supplied responses?
3:24:37 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	In response JI-3, personally not testified in favor of coal and gas fueled generating unit?
3:25:12 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	2005?
3:25:26 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Where did ultimately recommend acquisition of unit caveats?
3:26:17 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Discussed Tables 5 & 6, two portfolios modeled and discussed in testimony, just those two?
3:27:11 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Familiar with McDonald testimony?
3:27:27 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Not familiar with Joint Intervenors, if told you, would not know?
3:28:01 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Accurate to say you did not model and present results?
3:28:26 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Understanding is Joint Intervenors recommending not approving NGCCs?
3:28:48 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Are recommending CPCNs for battery facility and four solar?
3:29:07 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Not include battery or owned solar?
3:29:35 PM	Atty Crosby KU/LG&E - witness Sommer Note: Sacre, Candace	Reliability modeling recommendations not presented in testimony?
3:29:48 PM	Chairman Chandler Note: Sacre, Candace	Mr. Bellamy?
3:30:01 PM	Asst Gen Counsel Bellamy PSC - witness Sommer Note: Sacre, Candace	Cross Examination. Page 30, those select potential resources?
3:31:50 PM	Asst Gen Counsel Bellamy PSC - witness Sommer Note: Sacre, Candace	Most cost effective?
3:32:31 PM	Asst Gen Counsel Bellamy PSC - witness Sommer Note: Sacre, Candace	Included conversion of MC 2, any other considered companies should have considered?
3:34:18 PM	Asst Gen Counsel Bellamy PSC - witness Sommer Note: Sacre, Candace	When calculated present value revenue requirement, over what period calculated?
3:35:11 PM	Asst Gen Counsel Bellamy PSC - witness Sommer Note: Sacre, Candace	Have opinion as to time period determine present value revenue requirement?

3:36:44 PM	Asst Gen Counsel Bellamy PSC - witness Sommer Note: Sacre, Candace	What resources talking about, what costs thought not included?
3:38:07 PM	Asst Gen Counsel Bellamy PSC - witness Sommer Note: Sacre, Candace	Discussion of PPAs modeling PLEXOS based on single year and ProSim when go into effect, specific resource taken out?
3:39:37 PM	Asst Gen Counsel Bellamy PSC - witness Sommer Note: Sacre, Candace	Typically when did planning like to do 20 years, why is that?
3:40:43 PM	Asst Gen Counsel Bellamy PSC - witness Sommer Note: Sacre, Candace	Page 35, line 7, use LOLE and EUE test reliability portfolios, think that LOLE and EUE are appropriate metrics for measuring reliability?
3:42:01 PM	Chairman Chandler Note: Sacre, Candace	Mr. Crosby, Mr. Riggs, have cross for Wilson? (Click on link for further comments.)
3:42:15 PM	Chairman Chandler Note: Sacre, Candace	Recess five minutes.
3:42:29 PM	Session Paused	
3:49:31 PM	Session Resumed	
3:49:55 PM	Chairman Chandler Note: Sacre, Candace	Back on the record.
3:49:57 PM	Chairman Chandler Note: Sacre, Candace	Mr. Cmar, redirect?
3:50:03 PM	Atty Cmar Joint Intervenors - witness Sommer Note: Sacre, Candace	Redirect Examination. Asked about Table 5 and Table 6, anything you wanted to add clarify represented in tables?
3:50:45 PM	Atty Crosby KU/LG&E Note: Sacre, Candace	Object, surrebuttal testimony. (Click on link for further comments.)
3:52:07 PM	Chairman Chandler Note: Sacre, Candace	Mr. Cmar, another witness?
3:52:10 PM	Atty Cmar Joint Intervenors Note: Sacre, Candace	John Wilson.
3:52:43 PM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
3:52:51 PM	Chairman Chandler - witness Wilson Note: Sacre, Candace	Examination. Name and address?
3:53:08 PM	Atty Cmar Joint Intervenors - witness Wilson Note: Sacre, Candace	Direct Examination. Have documents with you?
3:53:22 PM	Atty Cmar Joint Intervenors - witness Wilson Note: Sacre, Candace	Any other documents?
3:53:25 PM	Atty Cmar Joint Intervenors - witness Wilson Note: Sacre, Candace	Cause testimony and answers be filed?
3:53:32 PM	Atty Cmar Joint Intervenors - witness Wilson Note: Sacre, Candace	Corrections?
3:53:38 PM	Atty Cmar Joint Intervenors - witness Wilson Note: Sacre, Candace	Ask same questions, responses be same?
3:53:50 PM	Chairman Chandler Note: Sacre, Candace	Mr. Cook?
3:53:52 PM	Chairman Chandler Note: Sacre, Candace	Mr. Malone?
3:53:56 PM	Chairman Chandler Note: Sacre, Candace	Mr. Osterloh?
3:53:58 PM	Chairman Chandler Note: Sacre, Candace	Ms. Baxter?
3:54:01 PM	Chairman Chandler Note: Sacre, Candace	Ms. Grundmann?

3:54:03 PM	Chairman Chandler Note: Sacre, Candace	Mr. Kurtz?
3:54:04 PM	Chairman Chandler Note: Sacre, Candace	Mr. Howard?
3:54:07 PM	Chairman Chandler Note: Sacre, Candace	Mr. Riggs?
3:54:16 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Cross Examination. Two recommendations, first page 4, present summary of both, lines 3-5, based on review of SB 4 companies demonstrated rebutt assumption?
3:55:25 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	The word generating defines itself?
3:55:48 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Page 9, lines 4-7, reading, (click on link for further comments), right?
3:56:15 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Agree solar power dispatchable?
3:56:25 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Will be dispatchable with exception of four solar PPAs?
3:56:54 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Page 14, companies' method reliability reasonable?
3:57:34 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	For purposes SB 4 evaluation, companies assessment of reliability reasonable?
3:58:18 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Nothing in testimony suggests were opining on SERVVM model?
3:58:38 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Page 23, state Brown 3 kept on line increase for reliability risk?
3:59:17 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Believe said that not retiring proposed units would create risk in winter period?
4:01:00 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Page 26, line 6, Cooper 1 and 2?
4:01:27 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Mean MC 1 and 2?
4:01:59 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Undertake to do that, think this is errata. Page 33, states, reading, (click on link for further comments), correct?
4:02:31 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Second opinion, reading (click on link for further comments, go back to page 1, lines 5-8, representing Joint Intervenors?)
4:03:15 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Make recommendation and express opinion?
4:03:31 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Page 40-46?
4:03:36 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Preparing testimony, reviewed Levitt and Sommer?
4:03:51 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Page 2, state reviewed draft Goggin testimony?
4:04:09 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Sierra Club and cities?
4:04:15 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	No mention offered on behalf of cities?

4:04:30 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Read testimony of McDonald?
4:04:48 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Summary makes no mention PJM or RTO membership?
4:05:09 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Not taking position why make recommendation?
4:05:51 PM	Atty Riggs KU/LG&E - witness Wilson Note: Sacre, Candace	Joint Intervenors recommending, not recommending, or taking no position on RTO membership?
4:05:55 PM	Chairman Chandler Note: Sacre, Candace	Mr. Bellamy, Ms. Vinsel?
4:06:04 PM	Gen Counsel Vinsel PSC - witness Wilson Note: Sacre, Candace	Cross Examination. Dispatchable, KRS 278.264 requires replace retired with new capacity dispatchable, difference between you and KU/LG&E battery storage, consider as generation and KU/LG&E considers no generation?
4:08:58 PM	Gen Counsel Vinsel PSC - witness Wilson Note: Sacre, Candace	Regard reference Cooper 1 and Cooper 2, in response to Staff Second, page 26 of testimony, happen to have LG&E/KU Response, Staff Second, Item 55?
4:10:18 PM	Gen Counsel Vinsel PSC - witness Wilson Note: Sacre, Candace	Refer to Staff First, Item 47(a), 00098, outage of Brown 3 at Cooper Station 1 and 2 could cause issues, as work with counsel work through that if that what referring to?
4:11:27 PM	Chairman Chandler Note: Sacre, Candace	Vice Chair?
4:11:28 PM	Chairman Chandler Note: Sacre, Candace	Commissioner?
4:11:30 PM	Chairman Chandler Note: Sacre, Candace	Redirect?
4:11:35 PM	Chairman Chandler Note: Sacre, Candace	Anything else from Joint Intervenors?
4:11:41 PM	Chairman Chandler Note: Sacre, Candace	No one else has any other witnesses?
4:12:01 PM	Chairman Chandler Note: Sacre, Candace	Exhibits. (Click on link for further comments.)
4:14:05 PM	Chairman Chandler Note: Sacre, Candace	Post-hearing data requests. (Click on link for further comments.)
4:14:58 PM	Chairman Chandler Note: Sacre, Candace	Briefs. (Click on link for further comments.)
4:21:10 PM	Chairman Chandler Note: Sacre, Candace	Briefing schedule and summary. (Click on link for further comments.)
4:29:37 PM	Chairman Chandler Note: Sacre, Candace	Anything else?
4:29:53 PM	Chairman Chandler Note: Sacre, Candace	Hearing is concluded.
4:30:15 PM	Session Ended	



Exhibit List Report

2022-00402 29Aug2023

**Kentucky Utilities Company and
Louisville Gas and Electric
Company (KU/LG&E)**

Name:	Description:
KIUC HEARING EXHIBIT 2	2022 RTO MEMBERSHIP ANALYSIS NOVEMBER 2022 UPDATED MAY 2023 EXCERPTS FROM GUIDEHOUSE STUDY
KIUC HEARING EXHIBIT 3	TABLE 4 JOINING PJM YIELDS INVESTMENT SAVINGS OF \$130 - \$140 MILLION ANNUALLY STARTING IN 2028
KIUC HEARING EXHIBIT 4	2022 RTO MEMBERSHIP ANALYSIS LG&E/KU PPL COMPANIES NOVEMBER 2022 UPDATED MAY 2023 33 COSTS AND BENEFITS ANALYZED
KU/LG&E HEARING EXHIBIT 2	PJM FRR REPORT FEBRUARY 24 2023

2022 RTO Membership Analysis



November 2022

UPDATED MAY 2023

Benchmarking

Guidehouse updated their existing models with the Companies' data and benchmarked their forecasts of generation and production costs to approximate the results of the Companies' existing 2023 Business Plan forecasts. These models included developing forecasts for energy and capacity market prices.

Standalone Scenario

Guidehouse developed a status quo scenario representing the Companies remaining standalone (i.e., outside PJM's footprint), including a forecast for replacement generation required to meet the Companies' summer and winter reserve margin targets. This scenario's assumptions include mid fuel prices and no future CO₂ emissions regulations and is referenced as Case 1-Standalone. Guidehouse developed potential capacity expansion plans for the Companies and PJM and forecasts for the Companies' cost to serve load, energy market prices, and the Companies' energy market imports and exports while outside PJM. The modeled expansion plan for the Companies is summarized in Table 4 below.

Table 4 - LG&E/KU Modeled Expansion Plan, Case 1-Standalone (Nameplate MW)

	Combined Cycle Gas	Simple Cycle Gas	Battery Storage	Solar	Wind
2025					
2026					
2027				100	
2028	484			200	
2029	484			100	
2030					
2031					
2032					
2033				100	
2034		400		250	
2035	484			250	
2036	800		100	400	
2037		200	200	250	100
2038		200	200	250	
2039		200	200	250	
2040	968	200	200		

RTO scenario 3,220 1,200 900 2,150 100 7,570

Guidehouse developed a scenario representing the Companies joining PJM, including a forecast for replacement generation required to meet PJM's resource requirements. This

scenario's assumptions also include mid fuel prices and no future CO₂ emissions regulations and is referenced as Case 1-RTO.

Starting in 2028, to eliminate the uncertainty and risk exposure regarding PJM's future capacity market rules and prices, the Companies assumed they would follow PJM's existing fixed resource requirement ("FRR") provision. The FRR allows Companies to meet their resource adequacy requirements with their own resources outside of PJM's capacity market while still operating in PJM's energy markets.²⁵ Based on the Companies' assumed retirement schedule, Guidehouse developed an expansion plan to meet the FRR provision. Guidehouse also developed a capacity expansion plan for PJM and forecasts for the Companies' cost to serve load, energy market prices, and the Companies' energy market imports and exports as a PJM member. The modeled expansion plan for the Companies is summarized in Table 5 below.

²⁵ An FRR entity must annually demonstrate their ability to meet PJM's requirements and must commit specific resources to their capacity plan. FRR entities are subject to shortage and performance penalties if their resource plan is inadequate. See <https://pjm.com/-/media/committees-groups/committees/mic/2020/20200108/20200108-item-04c-frr-alternative-education.ashx> and <https://www.pjm.com/-/media/about-pjm/newsroom/fact-sheets/securing-resources-through-fixed-resource-requirement-fact-sheet.ashx>.

Table 5 - LG&E/KU Modeled Expansion Plan, Case 1-RTO (Nameplate MW)

	Combined Cycle Gas	Simple Cycle Gas	Battery Storage	Solar	Wind
2025					
2026					
2027					
2028	484			300	
2029				100	
2030					
2031					
2032					
2033				100	
2034	484	500		250	
2035			100	350	
2036	400			100	
2037		400	200	250	100
2038			200	250	
2039	484	400		250	
2040			200		

1,852 1,300 700 1,950 100 5,902

Note that the standalone and RTO expansion plans Guidehouse’s model generated for the Companies both add almost 1,000 MW of NGCC capacity, 400 MW or more of simple-cycle CT capacity, and 750 MW of solar capacity by 2034.

The PJM energy market benefits and costs resulting from the Guidehouse analysis vary significantly by case and range from a benefit of over \$300 million in a single year to a cost of almost \$500 million, all in nominal dollars.

Capacity Revenues (“PJM Capacity Market Benefits/(Costs)”)

In the RTO scenario, the Companies assumed they would sell capacity above PJM’s FRR capacity requirements to meet load until 2028, when the assumed retirement schedule resulted in a capacity need under PJM’s resource adequacy requirements. For the planning years of 2025/2026 and 2026/2027, the Companies forecasted potential revenues from PJM’s capacity market based on PJM’s projected resource requirements and historical capacity auction prices, capacity clearing rates, and peak load coincidence with the Companies, specified as follows:

- PJM’s forecasted pool requirement of 9.18% on an unforced capacity basis.
- Guidehouse’s forecast of capacity prices for the following planning years (in nominal dollars):
 - 2025/2026: \$53.12/MW-day

TABLE 4. JOINING PJM YIELDS INVESTMENT SAVINGS OF APPROX. \$130 – \$140 MILLION ANNUALLY STARTING IN 2028

(All capacity values are winter ratings)

	Unit	2026	2027	2028	2029	2030	2035	2040	2045	2050
Status Quo: LG&E-KU Stand Alone (Winter Values)										
[1] Resource Requirement	(MW)	7,864	8,000	7,996	7,995	7,994	7,999	8,008	8,017	8,026
[2] Existing and Planned Resources (w/o NGCC Builds)	(MW)	7,939	7,664	6,790	6,804	6,805	6,805	6,647	6,647	6,647
[3] Planned NGCC Additions	(MW)	0	641	1,282	1,282	1,282	1,282	1,282	1,282	1,282
[4] Other Additions Needed (Surplus)	(MW)	(75)	(305)	(76)	(91)	(93)	(88)	79	88	97
[5] Annualized Incremental Capacity Cost	(\$M/yr)	\$0	\$69	\$139	\$139	\$139	\$139	\$144	\$144	\$145
Change Case: LG&E-KU Joins PJM (Annual/Summer Values)										
[6] Resource Requirement	(MW)	6,818	6,921	6,890	6,878	6,875	6,852	6,828	6,804	6,780
[7] Existing and Planned Resources (w/o NGCC Builds)	(MW)	8,080	7,856	6,951	6,905	6,856	6,590	6,433	6,430	6,429
[8] New NGCC and Other Additions	(MW)	-	-	-	-	-	-	-	-	-
[9] Conversion of ICAP Shortfall/Excess to UCAP	(MW)	(141)	(117)	(61)	(61)	(61)	(63)	(54)	(55)	(56)
[10] Net Sale (Purchase) Qty from Market	(UCAP MW)	1,120	818	0	(35)	(81)	(325)	(449)	(429)	(407)
[11] PJM Capacity Price	(\$/UCAP MW/d)	\$55	\$60	\$81	\$91	\$93	\$74	\$59	\$66	\$72
[12] Annual Incremental Capacity Cost (Revenue)	(\$M/yr)	(\$23)	(\$18)	(\$0)	\$1	\$3	\$9	\$10	\$10	\$11
Comparison of PJM vs. Status Quo										
[13] Annualized Capacity Investment Savings in PJM	(\$M/yr)	\$23	\$87	\$139	\$138	\$136	\$130	\$134	\$134	\$134

Source and Notes: All resource capacity data from CPEN Plan

[1]: Winter Peak Load x (1 + LG&E-KU Winter PRM for 1-in-10); Reserve Margin from Resources to Meet the Winter Demand & Winter Recovery Reserves.

[2]: Winter Totals of Existing Dispatchable Resources + Intermittent/Limited-Duration Resources – Retirements + SCCTs

[3]: Winter NGCC Builds

[4]: [1] - [2] - [3]

[5]: (Min of [4] and 0) x CT Gross CONE / 1000 x Rating Adjustment + [3] x (Capital Recovery Factor x CC CAPEX + CC Firm Gas + CC FOM) / 1000 x Rating Adjustment; CT Gross CONE from Wilson Testimony Exhibit SAW-1, D-18, p.133, CC Firm Gas, Discount Rate and Lifetime for Capital Recovery Factor from Wilson Testimony, CC CAPEX, CC FOM from NRC Staff Rating Adjustment = ratio of summer to winter ratings in CPEN Plan.

[6]: Summer Peak Load x Coincidence Factor x (1 + PRM); Coincidence Factor from Section II.A; PRM from PJM Reserve Requirement Report, p. 8

[7]: Summer Totals of Existing Dispatchable Resources + Intermittent/Limited-Duration Resources - Retirements + SCCTs; Battery and Tracking Solar capacity values based on relevant values from 2021 PJM Resource Report

[8]: No new NGCC and other additions

2022 RTO Membership Analysis



PPL companies

November 2022

UPDATED MAY 2023

Of the four cases studied, the Companies believe Case 4 is the least likely; CO₂ emission regulations would tend to reduce the demand for fossil fuels, making persistent high fossil fuel prices less likely in that scenario (barring long-term supply constraints). The Companies' view is that the future is more likely to fall within the ranges of fuel prices and CO₂ restrictions modeled in Cases 1-3.

3.3 Costs and Benefits Analyzed

The Companies identified the following key categories of costs and benefits to consider regarding possible RTO membership. Note that the values of the costs and benefits for most of these categories do not change across the four fuel-price and CO₂-emissions cases because the value of the costs or benefits do not vary with fuel prices or CO₂ regulations.

Note also that the names shown in parentheses in the following headings reflect the names used for the cost and benefit categories shown in the cost-benefit tables for the four fuel-price and CO₂ cases in Appendix 1.

RTO Administrative Fee ("PJM Admin Fee Cost")

Every RTO has administrative costs it must recover from market participants. The Companies calculated the PJM administrative fee as a charge per MWh of load served. The RTO Administrative Fee does not change between cases because forecasted load does not vary across cases. The Companies calculated the administrative charge per MWh by escalating PJM's current charge by 2% per year to account for inflation, a conservative approach that tends to favor PJM membership by likely understating this cost given current inflation expectations. In nominal dollars, this cost increases from \$19.2 million to \$26.4 million per year.

RTO Energy Uplift Cost ("PJM Energy Uplift (BOR) Cost")

Every RTO must provide energy balancing operating reserves to ensure grid stability, and it must recover those costs (also called uplift costs) from market participants. The Companies calculated the PJM energy uplift cost as a charge per MWh of load served. Thus, the PJM Energy Uplift (BOR) Cost does not change between cases because forecasted load does not vary across cases. The Companies held the PJM energy uplift cost per MWh constant across the 16 years of the study at about \$5 million per year in nominal dollars.

Transmission Expansion Cost ("PJM Transmission Expansion Cost")

Transmission planning and the allocation of expansion costs are major activities for RTOs. Under current PJM policy, the cost of new high voltage transmission projects approved under its annual Regional Transmission Expansion Planning ("RTEP") process is allocated based on a combination of zonal load ratio share and flow-based calculation. The Companies estimated their allocation for projects documented in the RTEP within this

analysis period using PJM's publicly posted RTEP project information. Consistent with the 2021 RTO Membership Analysis, in this analysis the Companies used PJM's most current RTEP project information (April 2022). Based on this information, the Companies' annual transmission expansion costs as PJM members are estimated to range from \$17.8 million to \$20.5 million, which values do not change between cases studied because the Companies' load (and therefore load share) does not change between cases.

Note that the Companies did not include in standalone operation possible transmission cost sharing in the Southeastern Regional Transmission Planning ("SERTP") region for FERC Order 1000 compliance because such future costs, if any, are unknown at this time. In addition, the Companies have not incurred any historical transmission project costs from the SERTP region. Such costs, if any, would offset the net costs shown for PJM Transmission Expansion Cost in this comparative analysis. The Companies do not anticipate that such SERTP-related costs would be comparable to the PJM Transmission Expansion Cost values included in this analysis.

Internal Cost of RTO Membership ("LG&E/KU Internal Implementation")

As RTO members, the Companies would incur a small amount of ongoing internal cost to enable them to participate in the RTO. The amounts the Companies have projected (all less than \$1 million per year in nominal dollars) account only for anticipated hardware and software costs, including generation metering and software licensing costs. They do not include any personnel costs, and they do not vary across cases.

Lost Transmission Revenue ("LG&E/KU Lost Transmission Revenue")

In PJM, the Companies would have a zonal transmission rate that would be calculated in a similar fashion to how their transmission rate is calculated currently with the Companies as stand-alone transmission providers. In an RTO, the zonal transmission rate would apply to any network or point-to-point transmission that sinks in the zone, and the rate would continue to be based on the Companies' transmission revenue requirements. The analysis reflects an expected decrease in the sale of point-to-point transmission service resulting from RTO membership as the Companies would be under the RTO tariff and would not offer point-to-point transmission service directly. The lost transmission revenue included in this analysis ranges from \$3 million to \$8.6 million per year and does not vary between cases.

The Companies would also potentially receive an allocation of revenues from PJM based on the revenues that PJM collects for point-to-point transmission service that does not sink within the RTO (i.e., drive-out and drive-through transmission service). PJM has a mechanism for this allocation based on combinations of transmission plant in service ratio and flow-based derivations. Due to the difficulties in projecting drive-through and drive-

out transmission use, as well as flows and ratios that would drive the Companies' allocation of revenues, the Companies did not attempt to determine the potential projected value of this allocation and therefore did not include it in this analysis. When the Companies were previously members of MISO, revenues for drive-through and drive-out transmission use were around \$1 million annually. Due to the passage of time and changes in transmission facilities and use since the Companies' exit, the Companies did not use this historical performance value as a proxy but do believe it indicates that revenue from this service is not likely to be significant.

Lost Settlement Revenue ("LG&E/KU Lost Joint Party Settlement Revenue")

The Companies are parties to a settlement agreement between MISO, SPP, and others to address issues that arose from MISO's southern expansion to include Entergy and operate as a single Balancing Authority Area. Under the settlement agreement, MISO compensates SPP and others, including the Companies, for the use of these parties' systems. Although it is uncertain, the Companies determined it was reasonable to assume that compensation to the Companies under the settlement agreement would stop if the Companies were to integrate into PJM. The lost revenue ranges from \$1.5 million to \$2 million per year in nominal dollars and does not vary between cases.

RTO Energy Market Benefits or Costs ("PJM Energy Market Benefits/(Costs)")

The Companies engaged Guidehouse to model the potential energy and capacity market costs and benefits of joining PJM. This engagement was designed to allow for a third-party view and a more expansive level of modeling detail that is beyond the scope of the Companies' existing tools. The Companies' previous studies represented market prices as the result of market interactions, whereas Guidehouse attempts to model the interactions of all market parties. The Companies evaluated 11 potential consultants, interviewed a short list of three, and chose Guidehouse based on their more robust model and in-house modeling experience.

Guidehouse evaluated the potential costs and benefits related to PJM's energy and capacity markets in the following steps.²³

Data alignment

The Companies provided detailed data for existing unit and system specifications, fuel price forecasts, and an assumed schedule for unit retirements.²⁴ Appendix 2 and Exhibit 2 detail these assumptions.

²³ Guidehouse's full report of this analysis is attached as Exhibit 2.

²⁴ The assumed coal unit retirement schedule is consistent with the Companies' 2021 IRP.



Energy Transition in PJM: Resource Retirements, Replacements & Risks

Feb. 24, 2023

For Public Use

**KU/LG&E HEARING
EXHIBIT 2**

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Contents

Executive Summary	1
Background	4
Methodology	4
<i>Supply Exits</i>	5
Announced Retirements.....	6
Potential Policy Retirements	7
Potential Economic Retirements	9
Energy & Ancillary Services Revenue and Production Cost	9
Capacity Revenues and Fixed Avoidable Costs	10
Results and Estimated Impact	10
<i>Supply Entry</i>	10
Natural Gas Headwinds	10
Renewable Transition	11
Commercial Probability and Expanding Beyond the Queue.....	11
<i>Impact of Capacity Accreditation on Existing Renewables and Storage</i>	13
<i>Demand Expectations</i>	14
What Does This Mean for Resource Adequacy in PJM?	15

Executive Summary

Driven by industry trends and their associated challenges, PJM developed the following strategic pillars to ensure an efficient and reliable energy transition: facilitating decarbonization policies reliably and cost-effectively; planning/operating the grid of the future; and fostering innovation.

PJM is committed to these strategic pillars, and has undertaken multiple initiatives in coordination with our stakeholders and state and federal governments to further this strategy, including interconnection queue reform, deployment of the State Agreement Approach to facilitate 7,500 MW offshore wind in New Jersey, and coordination with state and federal governments on maintaining system reliability while developing and implementing their specific energy policies.

In light of these trends and in support of these strategic objectives, PJM is continuing a multiphase effort to study the potential impacts of the energy transition. The first two phases of the study focused on energy and ancillary services and resource adequacy in 2035 and beyond. This third phase focuses on resource adequacy in the near term through 2030.¹

Maintaining an adequate level of generation resources, with the right operational and physical characteristics², is essential for PJM's ability to serve electrical demand through the energy transition.

Our research highlights four trends below that we believe, in combination, present increasing reliability risks during the transition, due to a potential timing mismatch between resource retirements, load growth and the pace of new generation entry under a possible "low new entry" scenario:

- The growth rate of electricity demand is likely to continue to increase from electrification coupled with the proliferation of high-demand data centers in the region.
- Thermal generators are retiring at a rapid pace due to government and private sector policies as well as economics.
- Retirements are at risk of outpacing the construction of new resources, due to a combination of industry forces, including siting and supply chain, whose long-term impacts are not fully known.
- PJM's interconnection queue is composed primarily of intermittent and limited-duration resources. Given the operating characteristics of these resources, we need multiple megawatts of these resources to replace 1 MW of thermal generation.

¹ See [Energy Transition in PJM: Frameworks for Analysis | Addendum](#) (2021), and [Energy Transition in PJM: Emerging Characteristics of a Decarbonizing Grid | Addendum](#) (2022).

² See previous work on Reliability Products and Services, including [PJM's Evolving Resource Mix and System Reliability](#) (2017), [Reliability in PJM: Today and Tomorrow](#) (2021), [Energy Transition in PJM: Frameworks for Analysis | Addendum](#) (2021), and [work completed through the RASTF and PJM Operating Committee](#) (2022).

The analysis also considers a “high new entry” scenario, where this timing mismatch is avoided. While this is certainly a potential outcome, given the significant policy support for new renewable resources, our analysis of these long-term trends reinforces the importance of PJM’s ongoing stakeholder initiatives, including capacity market modifications, interconnection process reform and clean capacity procurement, and the urgency for continued, combined actions to de-risk the future of resource adequacy while striving to facilitate the energy policies in the PJM footprint.

The first two phases of the energy transition study assumed that PJM had adequate resources to meet load.

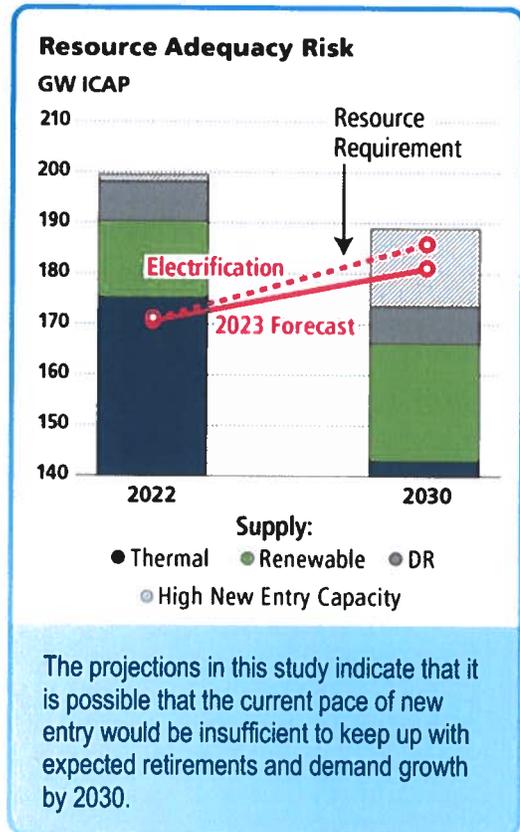
In this this third phase of this living study, we explore a range of plausible scenarios up to the year 2030, focusing on the resource mix “balance sheet” as defined by generation retirements, demand growth and entry of new generation.

The analysis shows that 40 GW of existing generation are at risk of retirement by 2030. This figure is composed of: 6 GW of 2022 deactivations, 6 GW of announced retirements, 25 GW of potential policy-driven retirements and 3 GW of potential economic retirements. Combined, this represents 21% of PJM’s current installed capacity³.

In addition to the retirements, PJM’s long-term load forecast shows demand growth of 1.4% per year for the PJM footprint over the next 10 years. Due to the expansion of highly concentrated clusters of data centers, combined with overall electrification, certain individual zones exhibit more significant demand growth – as high as 7% annually.⁴

On the other side of the balance sheet, PJM’s New Services Queue consists primarily of renewables (94%) and gas (6%). Despite the sizable nameplate capacity of renewables in the interconnection queue (290 GW), the historical rate of completion for renewable projects has been approximately 5%. The projections in this study indicate that the current pace of new entry would be insufficient to keep up with expected retirements and demand growth by 2030. The completion rate (from queue to steel in the ground) would have to increase significantly to maintain required reserve margins.

In the study, we also consider generation entry beyond the queue using projections from S&P Global. Those projections indicate that, despite eroding reserve margins, resource adequacy would be maintained if the influx of renewables materializes at a rapid rate and gas remains the transition fuel, adding 9 GW of capacity. The analysis performed at the Clean Attribute Procurement Senior Task Force (CAPSTF) also suggests that further gas expansion is economic and competitive.⁵



³ Unless otherwise noted, thermal capacity values are expressed in ICAP, without adjustment for EFORd.

⁴ [PJM Load Forecast Report, January 2023](#).

⁵ [CAPSTF Analysis, Initial Results](#); Emmanuele Bobbio, Sr. Lead Economist – Advanced Analytics, PJM, Dec. 16, 2022.

Balance Sheet Summary (2022–2030)				
Retirements 40 GW 60% Coal 30% Natural Gas 10% Other 	New Entry Wind/Solar⁶ Low = 48 GW-nameplate / 8 GW-capacity High = 94 GW-nameplate / 17 GW-capacity 	New Entry Standalone Storage Low = 3 GW High = 4 GW 	New Entry Thermal Low = 4 GW High = 9 GW 	Load Growth 2023 Forecast = 11 GW Electrification Forecast = 13 GW 
Unless otherwise noted, thermal capacity values are expressed in ICAP, without adjustment for EFORD.				

For the first time in recent history, PJM could face decreasing reserve margins should these trends continue. The amount of generation retirements appears to be more certain than the timely arrival of replacement generation resources and demand response, given that the quantity of retirements is codified in various policy objectives, while the impacts to the pace of new entry of the Inflation Reduction Act, post-pandemic supply chain issues, and other externalities are still not fully understood.

The findings of this study highlight the importance of PJM's ongoing stakeholder initiatives (Resource Adequacy Senior Task Force, Clean Attribute Procurement Senior Task Force, Interconnection Process Subcommittee), continued efforts between PJM and state and federal agencies to manage reliability impacts of policies and regulations, and the urgency for coordinated actions to shape the future of resource adequacy. The potential for an asymmetrical pace in the energy transition, in which resource retirements and load growth exceed the pace of new entry, underscores the need to enhance the accreditation, qualification and performance requirements of capacity resources.

The composition and performance characteristics of the resource mix will ultimately determine PJM's ability to maintain reliability. It is critical that all PJM markets effectively correct imbalances brought on by retirements or load growth by incentivizing investment in new or expanded resources.

⁶ Includes hybrid projects with battery storage

Background

Resource adequacy is the ability of the electric system to supply the aggregate energy requirements of electricity to consumers at all times, taking into account scheduled and reasonably expected unscheduled outages of generation and transmission facilities. To achieve the goal of resource adequacy, PJM maintains an Installed Reserve Margin in excess of the forecast peak load that achieves a loss-of-load expectation (LOLE) of one day in 10 years. This LOLE standard is consistent with that prescribed in the ReliabilityFirst Corporation standard for planning resource adequacy.⁷

Long-term reliability and resource adequacy are addressed through the combined operation of PJM's electricity markets, and in particular the capacity market, called the Reliability Pricing Model (RPM). Each PJM member that provides electricity to consumers must acquire enough power supply to meet demand, not only for today and tomorrow, but for the future. Members secure these capacity resources for future energy needs through a series of base and incremental capacity auctions, as well as Fixed Resource Requirement plans.

The capacity market ensures long-term grid reliability by procuring the appropriate amount of power supply resources needed to meet predicted energy demand up to three years in the future. These capacity resources have an obligation to perform during system emergencies, and are subject to penalties if they underperform. By matching generation with future demand, the capacity market creates long-term price signals to attract needed investments to ensure adequate power supplies. This exchange provides consumers with an assurance of reliable power in the future, while capacity resources receive a dependable flow of income to help maintain their existing capability, attract investment in new resources, and encourage companies to develop new technologies and sources of electric power.

Methodology

The size, composition and performance characteristics of the resource mix will determine PJM's ability to maintain reliability. This study explores a range of scenarios in the context of resource adequacy, focusing on the resource mix "balance sheet" as defined by demand growth, generation retirements and new entry of generation. Using the methodology described in this section, PJM evaluates the future of resource adequacy by estimating the amount of capacity required to cover load expectations versus expected capacity for the years 2023 through 2030.

The study's initial supply levels are 192.3 GW of installed capacity from generation resources and 7.8 GW of installed capacity from demand response capacity resources. The generation mix is approximately 178.9 GW of thermal resources and 13.3 GW of renewables and storage.⁸

⁷ RFC Standard BAL-502-RF-03: Planning Resource Adequacy Analysis, Assessment and Documentation

⁸ This value includes the capacity value of run-of-river hydro, pumped storage hydro, solar, onshore wind, offshore wind and battery energy storage.

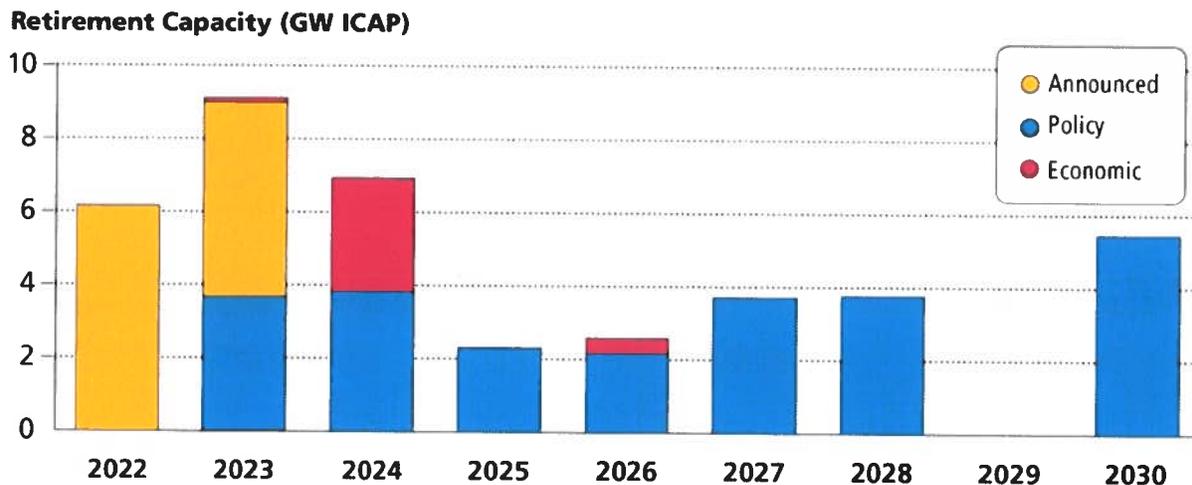
Supply Exits

PJM is undergoing a major transition in the resources needed to maintain bulk power grid reliability.

Historically, thermal resources have provided the majority of the reliability services in PJM. Today, a confluence of conditions, including state and federal policy requirements, industry and corporate goals requiring clean energy, reduced costs and/or subsidies for clean resources, stringent environmental standards, age-related maintenance costs, and diminished energy revenues are hastening the decline in thermal resources.

This study estimates anticipated retirements through 2030 by adding announced retirements with retirements likely as a result of various state and federal policies, and then with those at risk for retirement due to deteriorating unit economics. Potential policy-driven retirements, in this context, reflect resources that are subject to current and proposed federal and state environmental policies, in which it is conservatively assumed that the costs of mitigation and compliance could economically disadvantage these resources to the point of retirement. **Figure 1** highlights the 40 GW of projected generation retirements by 2030, which is composed of: 12 GW of announced retirements⁹, 25 GW of potential policy-driven retirements¹⁰ and 3 GW of potential economic retirements. Combined, this represents 21% of PJM's current installed capacity.¹¹ This section describes each category of potential retirements in more detail.

Figure 1. Total Forecast Retirement by Year (2022–2030)



⁹ Includes 6 GW of 2022 retirements.

¹⁰ Note that 7 GW of the 25 GW of supply with policy risk was also identified to have more immediate economic risk. The year that these 7 GW of potential policy retirements shown in **Figure 2** is based on timing identified in the economic analysis. In **Figure 4**, these 7 GW are shown in terms of the regulatory compliance timeline alone. The timeline of these potential quantities of resource retirements does not factor in any reliability “off-ramps” that may be included in established policies.

¹¹ In this study, PJM assumes that a resource that exits would not return to service in a future delivery year, even if operational conditions improve. Historically, a small percentage of retiring units would instead enter a “mothball” or standby state, in which the unit is put into a state where it may not operate for one or more years; however, in order to obtain an operating permit renewal, the mothballed unit would have to comply with the most recent environmental standards, likely requiring costly upgrades, making investing in newer, cleaner technologies more inviting.

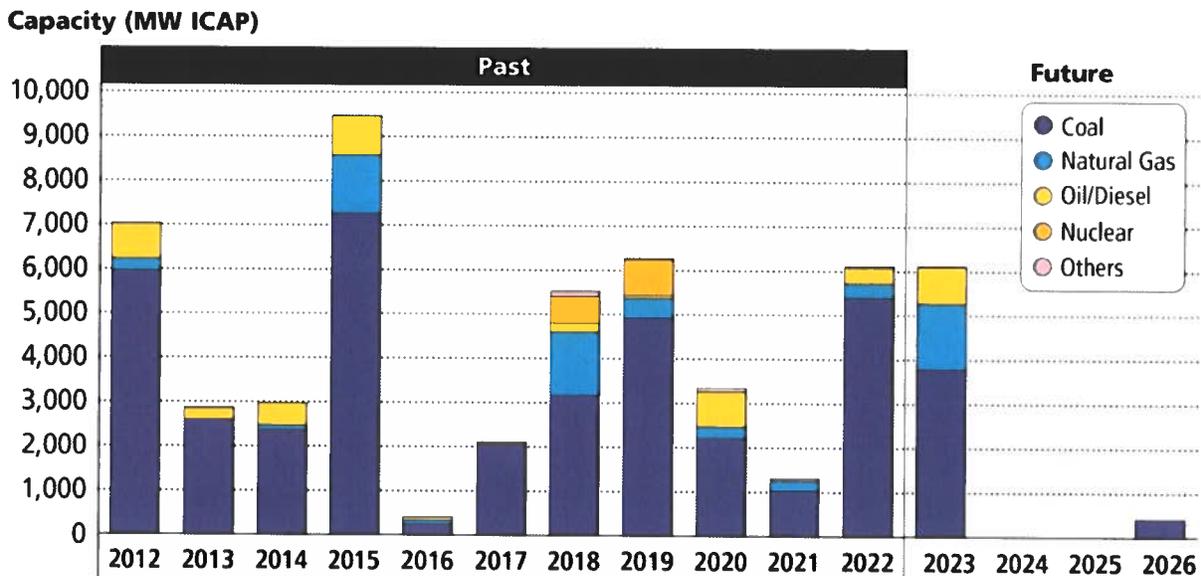
Announced Retirements

One of PJM's responsibilities is to ensure the continued reliability of the high-voltage electric transmission system when a generation owner requests deactivation. Through its Generation Deactivation process,¹² PJM identifies transmission solutions that allow owners to retire generating plants as requested without threatening reliable power supplies to customers. PJM may order transmission upgrades or additions built by transmission owners to accommodate the generation loss. PJM has no authority to order plants to continue operating. However, in some instances, to maintain reliability, PJM may formally request that a plant owner continue operating, subject to rates authorized by the Federal Energy Regulatory Commission (FERC), while transmission upgrades are completed.

Plant owners considering retirement must notify PJM at least two quarters before the proposed deactivation date. PJM and the transmission owners complete a reliability analysis in the subsequent quarter after notification to PJM. Generator retirements and any required system upgrades to keep the grid running smoothly are included in the PJM [Regional Transmission Expansion Planning](#) process and are reviewed with PJM members and stakeholders at the PJM [Transmission Expansion Advisory Committee](#).

Between 2012 and 2022, 47.2 GW of generation retired in PJM, as detailed by fuel type in **Figure 2**. In 2022, approximately 6 GW of generation deactivated and an additional 5.8 GW announced ("future") deactivations over the 2023–2026 time frame. The deactivations are slightly above the 10-year average of 4.3 GW, but well under the historical annual peak of 9.5 GW in 2015. Coal-fired resources account for approximately 89% of retired capacity in 2022.

Figure 2. Past and Announced Future Retirements



¹² See process details in PJM Manual 14-D, Section 9, and tracking of deactivation requests at <https://www.pjm.com/planning/services-requests/gen-deactivations>.

Potential Policy Retirements

An analysis of federal and state policies and regulations with direct impacts on generation in the PJM region yielded the largest group of potential future retirements in this study.¹³ As highlighted in **Figure 3**, the combined requirements of these regulations and their coincident compliance periods have the potential to result in a significant amount of generation retirements within a condensed time frame. These impacts will be reevaluated as these policies and regulations evolve. PJM will continue to work with both federal and state agencies on the development and implementation of environmental regulations and policies in order to address any reliability concerns.

Below are the policies and regulations included in the study:



[EPA Coal Combustion Residuals](#) (CCR): The U.S. Environmental Protection Agency (EPA) promulgated national minimum criteria for existing and new coal combustion residuals (CCR) landfills and existing and new CCR surface impoundments. This led to a number of facilities, approximately 2,700 MW in capacity, indicating their intent to comply with the rule by ceasing coal-firing operations, which is reflected in this study.



[EPA Effluent Limitation Guidelines](#) (ELG): The EPA updated these guidelines in 2020, which triggered the announcement by Keystone and Conemaugh facilities (about 3,400 MW) to retire their coal units by the end of 2028.¹⁴ Importantly, but not included in this study, the EPA is planning to propose a rule to strengthen and possibly broaden the guidelines applicable to waste (in particular water) discharges from steam electric generating units. The EPA is expecting this to impact coal units by potentially requiring investments when plants renew their discharge permits, and extending the time that plants can operate if they agree to a retirement date.



[EPA Good Neighbor Rule](#) (GNR): This proposal requires units in certain states to meet stringent limits on emissions of nitrogen oxides (NOx), which, for certain units, will require investment in selective catalytic reduction to reduce NOx. For purposes of this study, it is assumed that unit owners will not make that investment and will retire approximately 4,400 MW of units instead. Please note that the EPA plans on finalizing the GNR in March, which may necessitate reevaluation of this assumption.



[Illinois Climate & Equitable Jobs Act](#) (CEJA): CEJA mandates the scheduled phase-out of coal and natural gas generation by specified target dates: January 2030, 2035, 2040 and 2045. To understand CEJA criteria impacts and establish the timing of affected generation units' expected deactivation, PJM analyzed each generating unit's publically available emissions data, published heat rate, and proximity to Illinois environmental justice communities and [Restore, Reinvest, Renew](#) (R3) zones. For this study, PJM focuses on the approximately 5,800 MW expected to retire in 2030.

¹³ Policies impacting forward energy prices, such as the Regional Greenhouse Gas Initiative and Renewable Energy Credits, are implicitly included in economic analysis but are not explicitly included in analysis of policy-related retirements.

¹⁴ [See State Impact PA, Nov. 22, 2021](#). These facilities have not filed formal Deactivation Notices with PJM.



New Jersey Department of Environmental Protection CO₂ Rule: New Jersey's CO₂ rule seeks to reduce carbon dioxide (CO₂) emissions of fossil fuel-fired electric generating units (EGUs) through the application of emissions limits for existing and new facilities greater than 25 MW. Units must meet a CO₂ output-based limit by tiered start dates. The dates and CO₂ limits are:

- June 1, 2024 – 1,700 lb/MWh
- June 1, 2027 – 1,300 lb/MWh
- June 1, 2035 – 1,000 lb/MWh

PJM used emissions data found in [EPA Clean Air Markets Program Data](#) to evaluate unit compliance. Where a unit's average annual emissions rate was greater than the CO₂ limit on the compliance date, the unit was assumed to be retiring. In this study PJM, estimated retirements at approximately 400 MW in 2024 and approximately 2,700 MW in 2027.

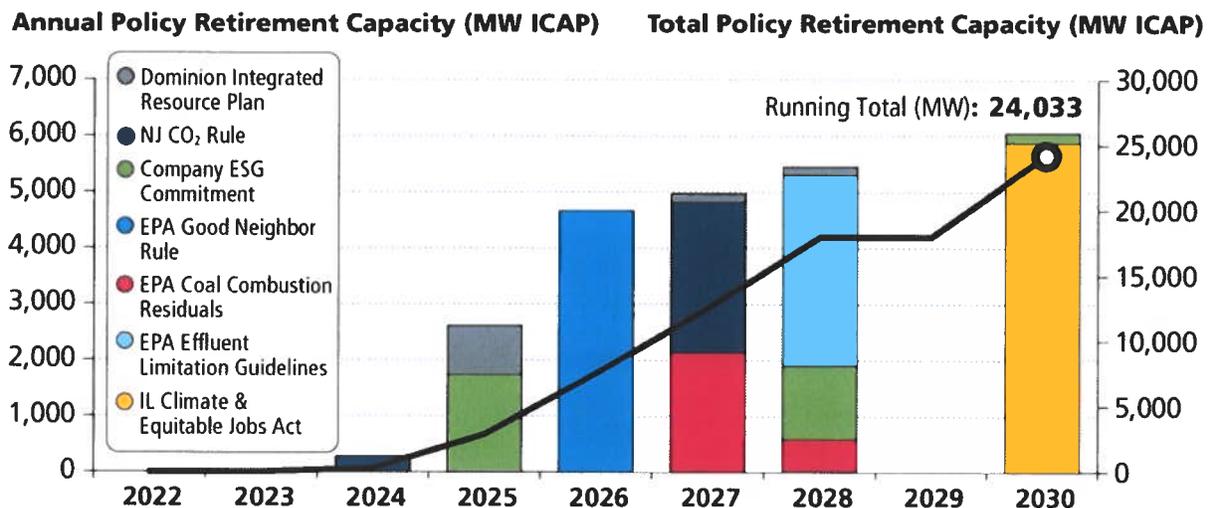


Dominion Integrated Resource Plan (IRP) commits to net zero carbon in its Virginia and North Carolina territory by 2050. PJM studied Dominion's Alternative Plan B retirement schedule, approximately 1,533 MW, for this analysis. Alternative Plan B proposes "significant development of solar, wind and energy storage resource envisioned by the VCEA," (Virginia Clean Economy Act of 2020), while maintaining natural gas generation for reliability, which is reflected in our analysis.



Company ESG (Environmental, Social, Governance) commitments are included where there is a commitment to retire resources per legal consent decree or other public statement. This includes the elimination of coal use and the retirement of the Brandon Shores, 1,273 MW, and Wagner, 305 MW, facilities in Maryland and the retirement of Rockport, 1,318 MW, in Indiana.

Figure 3. Potential Policy Retirements



Potential Economic Retirements

The third category of retirements in this study, beyond those formally announced and made likely by policy implementation, were identified through an analysis of revenue adequacy, the ability to economically cover going-forward costs from the wholesale markets. A net profit value was calculated for each existing generation resource using an estimate of future revenues and historical costs.

$$\text{Net Profit} = (\text{Gross Energy \& Ancillary Service Revenue} - \text{Production Costs}) \\ + (\text{Capacity Revenue}) - (\text{Fixed Avoidable Costs})$$

The results reveal that a portion of the thermal fleet is at risk of becoming unprofitable in the coming years.

The capacity market's Variable Resource Requirement (VRR) represents the set of prices for which load is willing to procure additional supply beyond the minimum reliability requirement. There are three points in the sloped demand curve, the first of which is anchored at a price 1.5 times the Net Cost of New Entry (Net CONE). Should the auction clear at this price level, the auction result signals that demand is willing to pay for the construction of new supply, minus the expected energy revenues the resource should expect to earn in the energy markets. As such, it is important to align the revenue expectations for the marginal resources with forward revenues, especially under PJM's continually changing landscape of business rules.

Energy & Ancillary Services Revenue and Production Cost

This study used a scaling approach to estimate forward unit-specific energy and ancillary services (E&AS) revenues from historical energy and ancillary service revenues by applying the following:

$$\text{Fwd Unit E\&AS Revenue} = \text{Hist Unit E\&AS Revenue} * \frac{\text{Fwd Reference E\&AS Revenue}^{15}}{\text{Hist Reference E\&AS Revenue}} * \frac{\text{Reference Avg Heat Rate}}{\text{Unit Avg Heat Rate}}$$

For a given reference resource type, unit dispatch was simulated using both historical and forward energy hub-adjusted energy prices. For the equivalent production cost model, the relative ratio of revenues and heat rates indicate the net effects of both rising fuel costs and energy price revenue. A unit on the margin in the energy markets, typically a natural gas unit, would set a locational price near its short-run marginal costs. Infra-marginal units, potentially coal units, would receive higher revenues as price-taking resources, and thus may see increased profitability. This is reflected in the analysis, in which a reference coal unit's forward revenues increased an average of 139% over previous revenue estimates.

¹⁵ The forward energy and ancillary services revenue calculation used in this study is the method that was developed for use in the Forward Net Energy & Ancillary Services Offset calculation originally developed in 2020, and filed as part of the most recent Quadrennial Review.

Capacity Revenues and Fixed Avoidable Costs

Unit-specific capacity revenues were calculated from prices and cleared quantities in the 2023/2024 Base Residual Auction (BRA). The study used the published 2023/2024 BRA [Default Gross Avoidable Cost Rate](#) (ACR) values as representative total fixed costs (\$/MW-day) required to keep the generating plant available to produce energy. In other words, these are projected costs that could be avoided by the retirement of the plant. Avoidable costs represent operational factors like operations and maintenance labor, fuel storage costs, taxes and fees, carrying charges, and other costs not directly related to the production of energy. When available, unit-specific ACR values from the 2023/2024 BRA supply offer mitigation process were used, otherwise the class average Gross ACR was used.

Results and Estimated Impact

This study assumes that a simulated economic loss would result in a retirement of the resource at the next available delivery year in which the unit is not committed for capacity. As such, a unit with a revenue loss that did not clear in the 2023/2024 BRA would exit in 2023, while a unit with a revenue loss that cleared in the 2023/2024 BRA would exit in 2024. While units that do not clear a single BRA may remain energy-only resources, this conservative assumption was used to provide awareness.

The economic analysis identified approximately 10 GW of supply in immediate economic risk, of which 7 GW of supply is also affected by policy risk, and 3 GW of supply is economic risk only. In aggregate, 6 GW are steam resources, and 4 GW represent combustion turbines and internal combustion resources. Several of the units identified were older steam boilers that had once converted from coal-fired to natural gas fuel; these resources are less efficient than a modern heat-recovery steam generator in a combined cycle unit. Fifty-three percent of the resources identified for economic risk did not have a PJM capacity obligation in Delivery Year 2023/2024, either through the FRR process or market clearing.

Supply Entry

The composition of the PJM Interconnection Queue has evolved significantly in recent years, primarily increasing in the amount of renewables, storage, and hybrid resources and decreasing in the amount of natural gas-fired resources entering the queue. The PJM New Services Queue stands at approximately 290 ICAP GW of generation interconnection requests, of which almost 94% (271 ICAP GW) is composed of renewable and storage-hybrid resources.

Natural Gas Headwinds

In the last decade, resources in the PJM region have benefitted from the proximity to the Marcellus Shale, an area that extends along the Appalachian Mountains from southern West Virginia to central New York. Beginning around 2010, gas extraction from hydraulic fracturing transformed this region into the largest source of recoverable natural gas in the United States. This local fuel supply decreased the prices for spot market natural gas in much of the PJM region, and prices in the PJM region often trade at negative basis to the Henry Hub spot price.

The entry of natural gas resources in the PJM region peaked in 2018, with 11.1 GW of generation commercializing that single year. From 2019 to 2022, a total of 8.1 GW of natural gas generation began service, or about a third of the 23 GW observed from 2015–2018. Queue proposals have also declined; over the last three years, only 4.1 GW of new natural gas projects entered the queue, while 15.1 GW of existing queue projects withdrew.¹⁶

Recent movement in the natural gas spot markets across the U.S. and Europe add another degree of uncertainty to future operations. In 2022, European natural gas supply faced many challenges resulting from the war in Ukraine and subsequent sanctions against Russia. Liquefied natural gas (LNG) imports into the EU and the U.K. in the first half of 2022 increased 66% over the 2021 annual average,¹⁷ primarily from U.S. exporters with operational flexibility. This international natural gas demand is a new competitor for domestic spot-market consumers, resulting in significantly higher fuel costs for PJM's natural gas fleet.

This study assumes that, of the approximately 17.6 GW of natural gas generation in the queue, only those that are proposed uprates of existing generation, or currently under construction, will complete.¹⁸ This results in 3.8 GW of entry from under-construction natural gas resources to be completed for the 2023/2024 Delivery Year. While 12 GW of natural gas have reached a signed Interconnection Service Agreement (ISA) stage, it is unclear what percentage of this capacity may move forward. If significantly more natural gas capacity achieved commercial operation, it could help avoid reliability issues.

Renewable Transition

PJM's projected resource mix continues to evolve toward lower-carbon intermittent resources. Entry into the queue from renewable and storage resources has been growing at an annualized rate of 72% per year since 2018, or 199 GW of capacity entry versus 2.8 GW commercializing and 42.1 GW withdrawn. This influx of renewable projects has led to a joint effort between PJM and its stakeholders to enact queue reforms intended to clear the backlog of projects, improve procedures around permitting and site control, simplify analysis by clustering projects, and accelerate projects that don't require network upgrades. FERC approved the proposed package in November 2022, with expected implementation in 2023.

Commercial Probability and Expanding Beyond the Queue

PJM staff developed several forecasts of the rate by which projects successfully exit the queue (the "commercial probability" of reaching an *In-Service* state). Since 1997, the PJM New Services Queue has tracked proposed generation interconnection projects from their submittal and study stages to completion of an ISA and Wholesale Market Participation Agreement (WMPA) and construction. At any point in the process, a resource may withdraw from the queue, effectively ending its commercial viability.

¹⁶ This capacity represents natural gas projects that were submitted prior to 2020 and withdrawn in the 2020–2022 time frame.

¹⁷ [Europe imported record amounts of liquefied natural gas in 2022](#), U.S. Energy Information Administration, June 14, 2022.

¹⁸ Under construction includes the New Service Queue *Partially in Service* – *Under Construction* and *Under Construction* statuses.

The study utilized a logistical regression classification algorithm to predict the probability of a project reaching an *In-Service* entry (or *Withdrawn* exit) based on several properties of the project. A logistical regression searches for patterns within training datasets, resulting in a model that can forecast a probability of a result. After applying the logistical regression model for 10 years of historical project completion (Y-queue to present) without project stage, approximately 15.3 GW-nameplate/8.7 GW-capacity were deemed commercially probable out of 178 GW of projects examined.

The model results for thermal resources were reasonably in line with expectations. However, the model produced extremely low entry from onshore wind, offshore wind, solar, solar-hybrid and storage resources. The uncertainty of completion rates of newer resource types, like offshore wind, likely plays a role in these model outcomes. After adjusting the new renewable capacity by Effective Load Carrying Capability (ELCC) derations, this commercial probability analysis estimates net 13.2 GW-nameplate / 6.7 GW-capacity to the system by 2030, as shown in **Figure 4**.

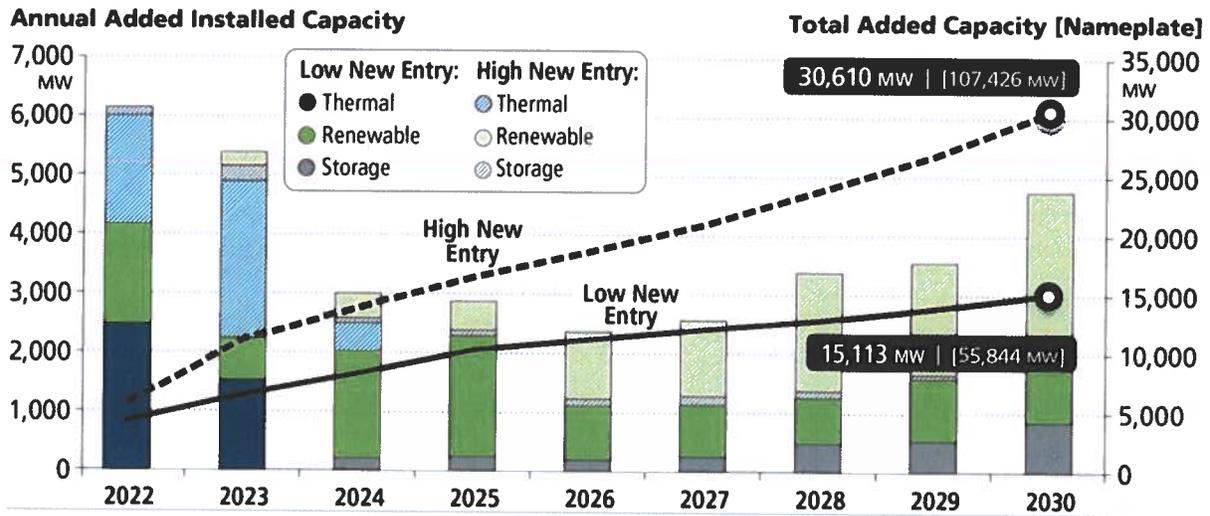
Given that this process may not capture recent policy changes and fiscal incentives toward renewable and storage development, and that the existing queue has fewer resources entered after 2026, PJM staff utilized two S&P Global Power Market Outlook analyses' generation expansion models. As estimates of future entry beyond the queue, these models are used to provide additional insight for the two scenarios: "Low New Entry" utilizes the "Planning Model,"¹⁹ and "High New Entry" utilizes the "Fast Transition" model.²⁰ Based on these models, PJM added additional capacity to its commercial probability data in each scenario.

These forecasts of generation expansion are economic resource planning solutions, which take state RPS requirements and capacity margins into account to ensure new renewable builds. Over the study period, the Low New Entry scenario adds 42.6 GW-nameplate/8.4 GW-capacity to supply expectations, resulting in total entry of 55.8 GW-nameplate/15.1 GW-capacity. The High New Entry scenario adds 107 GW-nameplate/30.6 GW-capacity after ELCC derations. Net natural gas entry was approximately 5 GW, and renewables was 48.5 GW-nameplate/10.4 GW-capacity, as shown in **Figure 4**.

¹⁹ S&P Global, North American Power Market Outlook, June 2022, planning model. This planning case incorporated effects from the 2021 Infrastructure Investment and Jobs Act, but not the 2022 Inflation Reduction Act.

²⁰ S&P Global, North American Power Market Outlook, Sept. 2022, Fast Transition model. This planning case assumes carbon net neutrality by 2050 through the IRA and additional policies, such as state clean energy policies, and as such assumes adjustments for increased electrification of heating, tax credits for renewable generation and higher levels of fossil retirements.

Figure 4. Forecast Added Capacity



Impact of Capacity Accreditation on Existing Renewables and Storage

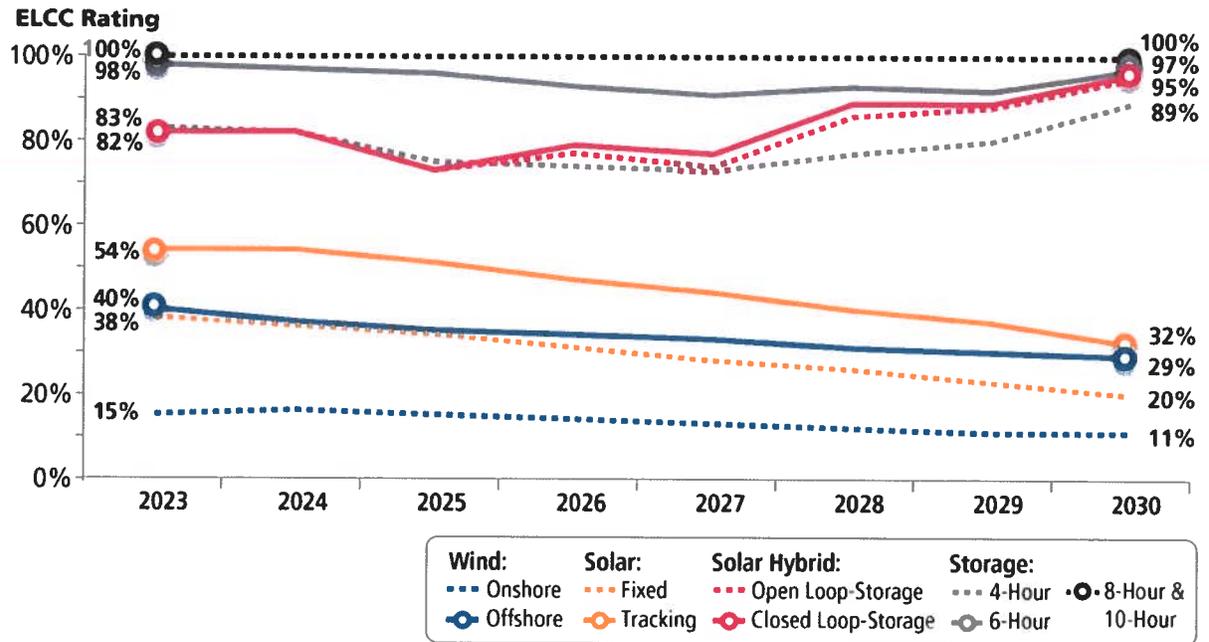
In July 2021, FERC accepted PJM’s ELCC methodology for calculating unforced capacity values for intermittent and energy storage capacity resource classes. The ELCC analysis²¹ examines load and resource performance uncertainty, and calculates an hourly loss-of-load probability (LOLP) to meet a one-in-10 year loss of load expectation (LOLE) adequacy criteria. The ELCC method examines the alignment of a given resource type’s capacity to high risk hours, as well as the change in risk hours proportional to the changes in portfolio size. The adjustments to accredited capacity went into effect in the 2023/2024 BRA executed in June 2022.

This study examined the current renewable generation fleet for the impact of future changes in capacity accreditation. Today, there are approximately 3.5 GW of onshore wind and solar capacity resources participating in the RPM capacity market as intermittent resources. From 2022 to 2030, this accredited capacity is expected to decline by 1.2 GW to 2.3 GW due to portfolio effects resulting in the increase of entry from other intermittent renewable resources.²² This adjustment is consistent with the renewable expectations presented in the [December 2021 Effective Load Carrying Capability \(ELCC\) Report](#).

²¹ [Manual 20, Section 5: PJM Effective Load Carrying Capability Analysis](#)

²² Approximate nameplate needed to replace 1 MW of thermal generation: Solar – 5.2 MW; Onshore Wind – 14.0 MW; Offshore Wind – 3.9 MW. These are average values.

Figure 5. Effective Load Carrying Capability (ELCC) Rating by Resource Type



Demand Expectations

Load forecasting is an important part of maintaining the reliability of the bulk electric system. Forecasting helps PJM make decisions about how to plan and operate the bulk electric system in a reliable manner, and how to effectively administer competitive power markets. PJM's Resource Adequacy Planning Department publishes an annual [Load Forecast Report](#), which outlines "long-term load forecasts of peak-loads, net energy, load management, distributed solar generation, plug-in electric vehicles and battery storage."

Along with the energy transition, PJM is witnessing a large growth in data center activity. Importantly, the PJM footprint is home to Data Center Alley in Loudoun County, Virginia, the largest concentration of data centers in the world.²³ PJM uses the [Load Analysis Subcommittee \(LAS\)](#) to perform technical analysis to coordinate information related to the forecast of electrical peak demand. In 2022, the LAS began a review of data center load growth and identified growth rates over 300% in some instances.²⁴ The 2023 PJM Load Forecast Report incorporates adjustments to specific zones for data center load growth, as shown in **Figure 5**.

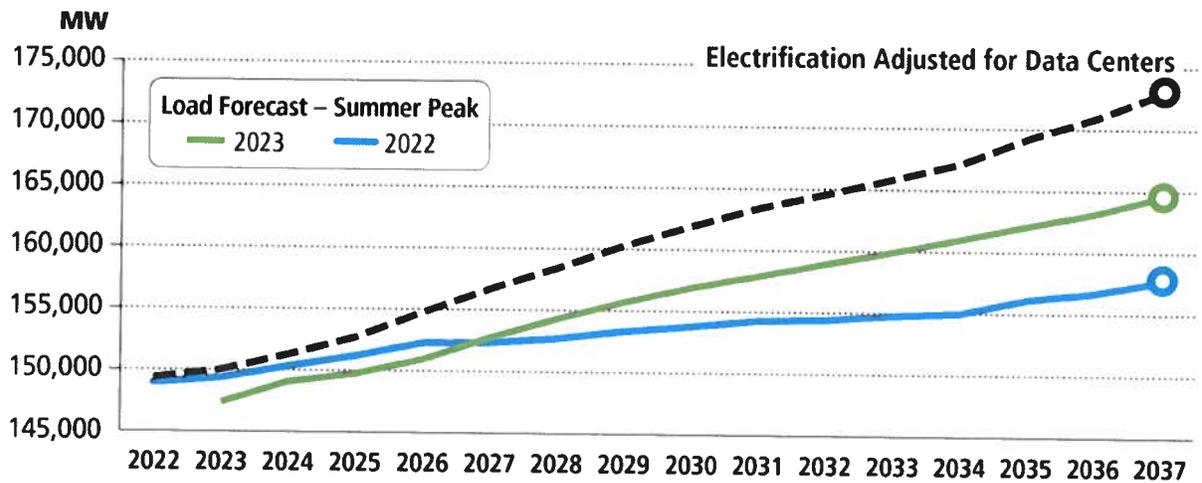
²³ See [Loudoun County Department of Economic Development](#), 2023.

²⁴ [Load Analysis Subcommittee: Load Forecast Adjustment Requests, Andrew Gledhill, Resource Adequacy Planning, Oct. 27, 2022](#)

Additionally, PJM is expecting an increase in electrification resulting from state and federal policies and regulations. The study therefore incorporates an electrification scenario in the load forecast to provide insight on capacity need should accelerated electrification drive demand increases.²⁵ This accelerated demand increase is consistent with the methodology used in the Emerging Characteristics of a Decarbonizing Grid paper.²⁶ That paper found electrification to have an asymmetrical impact on demand growth, with demand growth in the winter, mainly due to heating, more than doubling that in the summer. This would move the bulk of the resource adequacy risk from the summer to the winter.

Figure 6 highlights how updated electrification assumptions and accounting for new data center loads have impacted the summer peak between the 2022 and 2023 forecasts.²⁷

Figure 6. Impacts of Electrification and Data Center Load on Forecasts



What Does This Mean for Resource Adequacy in PJM?

PJM projects resource adequacy needs through the Reserve Requirement Study (RRS). The purpose of the RRS is to determine the required capacity or Forecast Pool Requirement for future years or delivery years based on load and supply uncertainty. The RRS also satisfies the North America Electric Reliability Corporation/ReliabilityFirst Adequacy Standard BAL-502-RFC-03, Planning Resource Adequacy Analysis, Assessment and Documentation, which requires that the Planning Coordinator performs and documents a resource adequacy analysis that applies a LOLE of one occurrence in 10 years. The RRS establishes the Installed Reserve Margin values for future delivery years. For this study PJM used the most recent 2022 RRS, as well as the 2021 RRS for comparison.

²⁵ Electrification assumptions are 17 million EVs, 11 million heat pumps, 20 million water heaters, 19 million cooktops in PJM by 2037, built on top of the 2022 Load Forecast.

²⁶ [Energy Transition in PJM: Emerging Characteristics of a Decarbonizing Grid](#), May 17, 2022.

²⁷ [2023 Load Forecast Supplement](#), PJM Resource Adequacy Planning Department, January 2023.

Combining the resource exit, entry and increases in demand, summarized in **Figure 7**, the study identified some areas of concern. Approximately 40 GW PJM's fossil fuel fleet resources may be pressured to retire as load grows into the 2026/2027 Delivery Year. At current low rates of renewable entry, the projected reserve margin would be 15%, as shown in **Table 1**. The projected total capacity from generating resources would not meet projected peak loads, thus requiring the deployment of demand response. By the 2028/2029 Delivery Year and beyond, at Low New Entry scenario levels, projected reserve margins would be 8%, as projected demand response may be insufficient to cover peak demand expectations, unless new entry progresses at a levels exhibited in the High New Entry scenario. This will require the ability to maintain needed existing resources, as well as quickly incentivize and integrate new entry

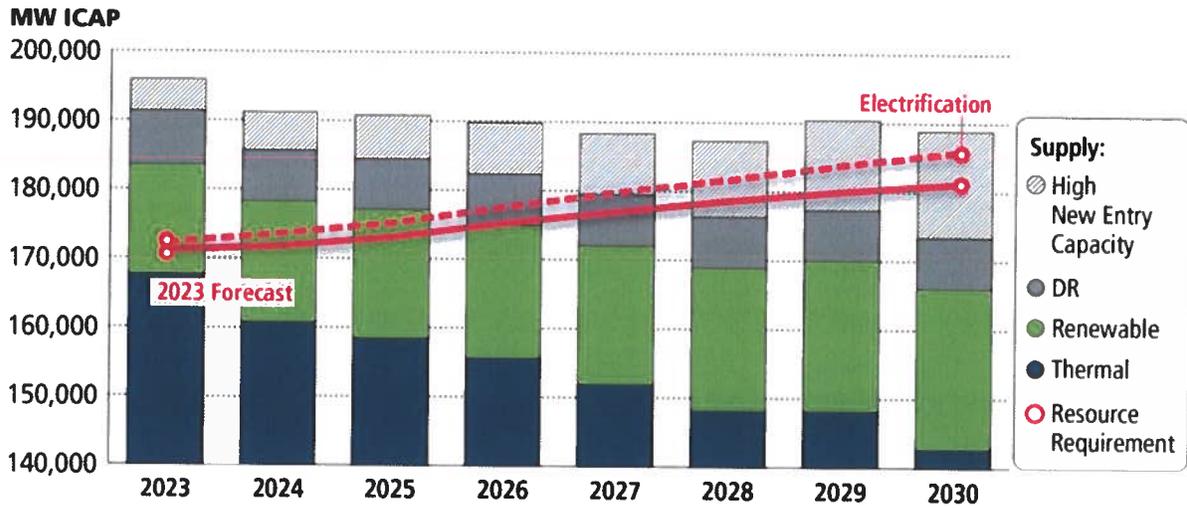
Table 1. Reserve Margin Projections Under Study Scenarios

Reserve Margin	2023	2024	2025	2026	2027	2028	2029	2030
Low New Entry								
2023 Load Forecast	23%	19%	17%	15%	11%	8%	8%	5%
Electrification	22%	18%	16%	13%	10%	7%	6%	3%
High New Entry								
2023 Load Forecast	26%	23%	21%	19%	17%	16%	17%	15%
Electrification	25%	22%	20%	18%	15%	14%	14%	12%

As witnessed during the rapid transition from coal resources to natural gas resources last decade, PJM markets provide incentives for capacity resources. The challenge will be integrating the level of additional resources envisioned to meet this demand, and therefore addressing issues such as resource capacity accreditation is critical in the near term. The low entry rates shown in our Low New Entry scenario are illustrative of recent completion history applied to the current queue. RTO capacity prices in recent auctions have been low for several delivery years, and capacity margins have historically reached around 28% of peak loads. As capacity reserve levels tighten, the markets will clear higher on the VRR curves, sending price signals to build new generation for reliability needs.

The 2024/2025 BRA, which executed in December 2022, highlighted another area of uncertainty. Queue capacity with approved ISAs/WMPAs is currently very high, approximately 35 GW-nameplate, but resources are not progressing into construction. There has only been about 10 GW-nameplate moving to in service in the past three years. There may still be risks to new entry, such as semiconductor supply chain disruptions or pipeline supply restrictions, which are preventing construction despite resources successfully navigating the queue process.

Figure 7. The Balance Sheet



For the first time in recent history, PJM could face decreasing reserve margins, as shown in **Table 1**, should these trends – high load growth, increasing rates of generator retirements, and slower entry of new resources – continue. The amount of generation retirements appears to be more certain than the timely arrival of replacement generation resources, given that the quantity of retirements is codified in various policy objectives, while the impacts to the pace of new entry of the Inflation Reduction Act, post-pandemic supply chain issues, and other externalities are still not fully understood.

The findings of this study highlight the importance of PJM's ongoing stakeholder initiatives (Resource Adequacy Senior Task Force, CAPSTF, Interconnection Process Subcommittee), continued efforts between PJM and state and federal agencies to manage reliability impacts of policies and regulations, and the urgency for coordinated actions to shape the future of resource adequacy.

The potential for an asymmetrical pace within the energy transition, where resource retirements and load growth exceed the pace of new entry, underscores the need for better accreditation, qualification and performance requirements for capacity resources.

The composition and performance characteristics of the resource mix will ultimately determine PJM's ability to maintain the reliability of the bulk electric system. Managing the energy transition through collaborative efforts of PJM stakeholders, state and federal agencies, and consumers will ensure PJM has the tools and resources to maintain reliability.

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