

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF DUKE ENERGY)	CASE NO.
KENTUCKY, INC. FOR AN ADJUSTMENT TO)	2023-00413
RIDER NM RATES AND FOR TARIFF APPROVAL)	

NOTICE OF FILING

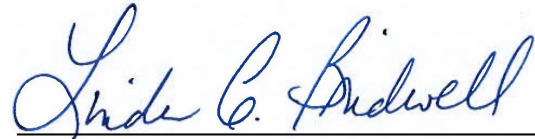
Notice is given to all parties that the following materials have been filed into the record of this proceeding:

- The digital video recording of the evidentiary hearing conducted on May 21, 2024 in this proceeding;
- Certification of the accuracy and correctness of the digital video recording;
- All exhibits introduced at the evidentiary hearing conducted on May 21, 2024 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 May 21, 2024.

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/pwfytnHJMZY>.

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 17th day of July 2024.



Linda C. Bridwell

Executive Director

Public Service Commission of Kentucky

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:


ELECTRONIC APPLICATION OF DUKE)	
ENERGY KENTUCKY, INC. FOR AN)	CASE NO.
ADJUSTMENT TO RIDER NM RATES AND)	2023-00413
FOR TARIFF APPROVAL)	


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 May 21, 2024. The Formal Hearing Log, Exhibits, and Exhibit List are included with the recording on May 21, 2024;
2. I am responsible for the preparation of the digital recording;
3. The digital recording accurately and correctly depicts the Formal Hearing of May 21, 2024, and;
4. The Formal Hearing Log attached to this Certificate accurately and correctly states the events that occurred at the Formal Hearing of May 21, 2024, and the time at which each occurred.

Signed this 15th day of July, 2024.


Candace H. Sacre
Candace H. Sacre
Administrative Specialist III


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



Date:	Type:	Location:	Department:
5/21/2024	Public Hearing\Public Comments	Hearing Room 1	Hearing Room 1 (HR 1)

Witness: Melissa Adams; Jacob Colley; Timothy Hohenstatt; Matthew Kalemba; Richard McCann; Nick Melillo; Bruce Sailors; John Swez
 Judge: Kent Chandler; Angie Hatton
 Clerk: Candace Sacre

Event Time	Log Event
9:11:52 AM	Chairman Chandler Note: Sacre, Candace On the record in Case No. 2023-00413.
9:11:54 AM	Session Started
9:12:03 AM	Chairman Chandler Note: Sacre, Candace Preliminary remarks.
9:12:44 AM	Chairman Chandler Note: Sacre, Candace Entry of appearance.
9:12:52 AM	Atty Vaysman Duke Kentucky. Note: Sacre, Candace Larissa Vaysman.
9:13:10 AM	Atty Honaker Duke Kentucky Note: Sacre, Candace Allyson Honaker.
9:13:20 AM	Asst Atty General West Note: Sacre, Candace Mike West.
9:13:26 AM	Atty Gary Joint Intervenors Note: Sacre, Candace Byron Gary, with me is Audrey Ernstberger.
9:13:37 AM	Atty Spenard KYSEIA Note: Sacre, Candace Dave Spenard and Randy Strobo.
9:13:46 AM	Asst Gen Counsel Tussey PSC Note: Sacre, Candace Moriah Tussey and Ashley Hatcher.
9:13:52 AM	Chairman Chandler Note: Sacre, Candace Public notice.
9:14:13 AM	Chairman Chandler Note: Sacre, Candace Outstanding motions. (Click on link for further comments.)
9:14:38 AM	Chairman Chandler Note: Sacre, Candace Public comments.
9:15:47 AM	Chairman Chandler Note: Sacre, Candace First witness?
9:15:54 AM	Atty Vaysman Duke Kentucky Note: Sacre, Candace Bruce Sailors.
9:16:02 AM	Chairman Chandler Note: Sacre, Candace Witness is sworn.
9:16:11 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace Examination. Name and address?
9:16:24 AM	Atty Vaysman Duke Kentucky - witness Sailors Note: Sacre, Candace Direct Examination. Title?
9:16:34 AM	Atty Vaysman Duke Kentucky - witness Sailors Note: Sacre, Candace Cause testimony and responses be filed?
9:16:40 AM	Atty Vaysman Duke Kentucky - witness Sailors Note: Sacre, Candace Adopting additional responses?

9:16:47 AM Atty Vaysman Duke Kentucky - witness Sailers
Note: Sacre, Candace Corrections or changes?

9:16:53 AM Atty Vaysman Duke Kentucky - witness Sailers
Note: Sacre, Candace Asked same questions, responses be same?

9:17:04 AM Atty Vaysman Duke Kentucky - witness Sailers
Note: Sacre, Candace Intent testimony and responses be admitted?

9:17:15 AM Chairman Chandler
Note: Sacre, Candace Procedural discussion. (Click on link for further comments.)

9:17:40 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Cross Examination. Application submitted on Dec 11 2023 includes direct testimony?

9:18:06 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace PDF version includes attachment identified as Attachment BLS-2, Cost of Service Review, have that?

9:18:36 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Including Attachment BLS-2?

9:19:10 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace On page 10 line 2, use phrase and identify Cost of Service COSS, see that?

9:19:53 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace If use phrase, use interchangeably referring same thing relied upon in 2022-00372, correct?

9:20:16 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Lines 15 and 16, reading (click on link for further comments), study period for COSS Apr 2021 through Mar 2022?

9:20:50 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Page 10, line 5, statement, reading (click on link for further comments), see that?

9:21:21 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Explain why made simplification?

9:21:58 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Unit cost analysis referring to is Table 3, summarize?

9:22:41 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Table 3, values be same if used same demand definitions in COSS?

9:23:04 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Made statement demand components simplified used in COSS for allocation into single demand 12 CPs, if not performed simplification COSS component values be same as presented here?

9:23:56 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Table 3, two columns, four rows, row for demand component, COS unit cost is \$29.42 under 12 CP kW, what reference point for describing that?

9:24:49 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Distribute exhibit marked as KYSEIA Hearing Exhibit 1, page in record, from attachment BLS-2, page 111 of 112. familiar with document?

9:24:50 AM KYSEIA HEARING EXHIBIT 1
Note: Sacre, Candace ATTY SPENARD KYSEIA - WITNESS SAILERS
Note: Sacre, Candace CASE NO. 2023-00413 ATTACHMENT BLS-2 PAGE 111 OF 112 INPUTS FOR CALCULATIONS

9:25:58 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Top left-hand corner, inputs for calculations, see that heading?

9:26:14 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Already in record, Duke Kentucky response to KYSEIA Second Request, Item 11, includes copy of most recent COSS, aware?

9:26:32 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Statements made and witness list filed May 14 one adopting responses of James Ziolkowski?
9:27:19 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Answer questions, item in record, Response to KYSEIA Second Request, Item 11, page 86 of 116, ask marked as KYSEIA Hearing Exhibit 2, contains monthly statistics for residential RS rate group, correct?
9:27:20 AM	KYSEIA HEARING EXHIBIT 2 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEIA-DR-02-011 ATTACHMENT PAGE 86 OF 116 MONTHLY STATISTICS RS RATE GROUP APR 2021 THROUGH MAR 2022
9:28:30 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In terms of this sheet, COSS April 2021 through March 2022, cost of service period?
9:28:52 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In terms of comparing Exhibits 1 and 2, column on Exhibit 2, system coincident demand, January 26 2022, if look at Exhibit 1, see same date and time, see numbers?
9:29:42 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Bottom of Exhibit 1, inputs for calculations, information pulled from the information on Exhibit 2 on system coincident demand?
9:30:22 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	System coincident demand represent 12 CP for study period?
9:30:53 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Exhibit 2, group coincident demand, describe difference?
9:32:11 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Exhibit 2 fair describe peak hours for COSS single hour in study period experienced system coincident demand peak?
9:32:38 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In testimony, line 8, page 10, single demand definition, familiar with coincident peaks?
9:33:07 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Duke Kentucky system, represent all customers?
9:33:26 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Group coincident demand is hour class separately experienced peak?
9:33:48 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Bottom corner of Exhibit 2, note states all hours are in EST, what EST mean?
9:34:33 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Page from attachment BLS-2, page 2 of 112, KYSEIA Exhibit 3, reformatted.
9:35:12 AM	Chairman Chandler Note: Sacre, Candace	Mark as KYSEIA 3?
9:35:13 AM	KYSEIA HEARING EXHIBIT 3 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 ATTACHMENT BLS-2 PAGE 2 OF 112
9:35:53 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Basic structure of BLS-2 to testimony, left-hand column, Rate Class, Ky_RS, see that?
9:36:42 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Kentucky residential, correct?

9:36:45 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace One column right, date, date of study period COSS is 04/01/2021, see that?

9:36:59 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Follow column down, every day from April 1 2021 through March 31 2022?

9:37:19 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Move one column over, have hour, 1 through 24 and resets again, showing 04012021 Hour 1, first hour of April 1st?

9:37:53 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Correspond midnight and 12:59 AM?

9:38:07 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace See No. 13, 13th hour of day, time between noon and 12:59 PM?

9:38:26 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Next column over, ABGCUST_SOLAR, see that?

9:38:41 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Stand for average customer presolar?

9:39:38 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Value under that, rust color, regard value for first hour for April 1 2021, 0.128?

9:40:00 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace What number mean?

9:40:21 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Per kW, what?

9:40:40 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Examination. Tell me again what average customer presolar represents?

9:41:10 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Know what every single customer used in Hour 1 on April 1 2021?

9:41:28 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace 134,850 customers January, what BLS-2 says?

9:41:43 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Know entire usage Hour 1 across group?

9:41:53 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Just dividing the two?

9:41:59 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Further adjusted?

9:42:05 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace How adjusted?

9:42:49 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Only use test year kWh, why use anything historical, what benefit if just be using forecasted usage amounts?

9:44:00 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Using two-year-old profiles updated for future anticipated billing determinants?

9:44:30 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Talking about imbedded COSS in forecasted test period rate case, use same profiles each hour how customers either use or produce electricity?

9:44:59 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Use those as basis for billing determinants as starting point for assumptions in forecasted rate case in 2022-00372?

9:45:24 AM Chairman Chandler
Note: Sacre, Candace Mr. Spenard?

9:45:35 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Cross Examination (cont'd). Usage values COSS for BLS-2, usage results based upon weather conditions in study period for COSS?
9:46:13 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Blue columns, overall caption is presolar less solar output (all values), see series of blue columns?
9:46:30 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	PVWatts 7.0815 kwDC, see that heading?
9:46:43 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	What does 7.0815 represent?
9:47:29 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Testimony on page 10, represent model results for what average solar generator produce on that day during that hour, how describe each of values that appear?
9:48:25 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	PVWatts, model generation number, correct?
9:48:49 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	What not represent on average basis Duke Kentucky residential service customer generators not represent actual numbers experienced in Duke system?
9:49:18 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	One column over, another set of lines, move over next column, see value 1.0128, move one more column 1.0128, arrive at net on customer basis, what final column represent?
9:50:25 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Import only?
9:50:35 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	That's the average customer receives?
9:50:42 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	When see zero, mean for that customer in that hour no import of energy to customer?
9:50:57 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Final column in blue, export where arrive at values Duke Kentucky modeled solar generation put into system?
9:51:51 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Profile through PVWatts calculator, Item 9, part D, responsible for 2-9, meteorological settings?
9:52:52 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Not know whether or not meteorological year included information for COSS study period?
9:53:40 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Conduct examination concerning how well actual weather conditions occurred match up to typical meteorological weather conditions used in PVWatts model?
9:54:11 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In Second Request, Item 9, Part F, response reference attachment supplied, Attachment 2, distribute marked KYSEIA Hearing Exhibit 4, page 177 of 187, if look at top left to rate, KY-RES?
9:54:12 AM	KYSEIA HEARING EXHIBIT 4 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 2 PAGE 177 OF 187
9:57:29 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Date 03112022, see that?

9:57:42 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Hour 17, see the hour column?
9:57:51 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Move down March 11 and restarts on March 12 hour 1, see that?
9:58:08 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Go down page, see entries for 03132022, find hour 1 for 03132022?
9:58:32 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	When look at this one, have 1, 2, 4, 5, 6, and so on, skips 3, explain?
9:59:05 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	With regard to DST on March 13, hour 1 consistent with EST?
9:59:48 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	EST can be EPT?
9:59:54 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Reference to that entry No. 4 hour, EPV?
10:00:09 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Hour 4 is first hour of DST, value for hour 4 consistent with EST or EPT?
10:01:00 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In response to Second Request, Item 9, Attachment 1 include results for PVWatts hourly profile, familiar with that?
10:01:16 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Provided that as response, KYSEIA-DR-02-009 Attachment 1, page 41 of 205, marked at KYSEIA Hearing Exhibit 5?
10:01:17 AM	KYSEIA HEARING EXHIBIT 5 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 1 PAGE 41 OF 205
10:02:30 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Includes profile information for model month 3 March and also information for day 13 for March, see those columns and rows?
10:03:23 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Information for March 13, see 0, 1, 2, 3, 4, 5, 6, 7, 8, 9?
10:03:47 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	No skip hour for 3?
10:03:55 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Understanding of PVWatts model, make any adjustment for leap years or daylight savings time?
10:04:45 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Hand out marked KYSEIA Hearing Exhibit 6, not in record, National Renewable Energy Laboratory, PVWatts Version 5 Manual?
10:04:46 AM	KYSEIA HEARING EXHIBIT 6 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS NATIONAL RENEWABLE ENERGY LABORATORY PVWATTS VERSION 5 MANUAL
10:05:17 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Page 4, solar resource, section 4, page 4, solar resource, second paragraph, reading (click on link for further comments), see that?
10:07:51 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Any reason believe PVWatts values appear in attachment 1 of response differ from that statement, have hourly data for 8,760 data points?

10:09:00 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Distribute two more documents, first is page 1 of 187 of response to KYSEIA Second, Item 9, Attachment 2, and second item is page 28 of 187, from Response to KYSEIA Second, Item 9, ask be marked Exhibit 7 and Exhibit 8, chance to look at those?
10:09:01 AM	KYSEIA HEARING EXHIBIT 7 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 2 PAGE 1 OF 187
10:11:24 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Response to Second Request, Item 9, Attachment 2?
10:11:34 AM	Chairman Chandler Note: Sacre, Candace	Same data set as 4? (Click on link for further comments.)
10:11:45 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Is group coincident demand for residential class for COSS?
10:12:12 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	From COSS, group coincident demand, April occurred on 040121 hour 20, see that?
10:12:44 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Look at information on Exhibit 7, begins with April 1 2021 and down to hour 20 and average customer value 1.55719, see that?
10:13:20 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Row right below that, 1.59927, see that?
10:13:30 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Hour 21 value greater than, equal to, or less than value 20 hour?
10:14:13 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Exhibit 8, page 28 of 187 of response, May 23 2021 hour 22, with this one COSS group coincident demand peak on 05242021 hour 18, go down and look at hour 18, average customer usage is 2.31942, see that?
10:14:14 AM	KYSEIA HEARING EXHIBIT 8 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEAI-D-02-009 ATTACHMENT 2 PAGE 28 OF 187
10:15:10 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	One row down, hour 19, number is 2.36323. see that?
10:15:20 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Hour 19 value greater than, equal to, less than value 18 hour?
10:15:36 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Say expect be so, help us understand why?
10:16:19 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In terms of presentation of evidence, peak model on page 28 of 187 would have peak occurring in hour 19 rather than 18, correct?
10:17:05 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Testimony includes BLS-2, page 1 of 112, in record, four blocks of information?
10:18:30 AM	Chairman Chandler Note: Sacre, Candace	Page that starts with comparison views? (Click on link for further discussion.)
10:18:56 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Understanding document, upper left-hand block of information, see that?
10:19:20 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Have column for each month, see those?

10:19:26 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace One correspond with January?

10:19:31 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Then have kilowatt hour consumed?

10:19:39 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Then kilowatt exported, because presolar, no values?

10:19:51 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Then have 12CP demand kilowatt?

10:19:57 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Move through next columns, see all those?

10:20:27 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Upper left-hand block represent Duke Kentucky baseline for what COSS looks like without solar for residential class?

10:21:13 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Move down page to block below, see that block?

10:21:38 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Where do see column with amounts for kW hours exported, export value, see those entries?

10:22:33 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Upper block represent Duke Kentucky review of residential class without solar generation?

10:23:09 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Matching up response, line appears below second block, 794.08, see that?

10:23:40 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Items represent based on COSS attributable to residential class customers having solar generation?

10:23:59 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace When move to right, two blocks, describe difference?

10:24:36 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Correct difference between information upper block presolar COSS and information in upper block for RS presolar billing?

10:25:32 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace And rate case being 2022-00372?

10:25:40 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Block below that what represent?

10:26:20 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Value \$770.02?

10:26:35 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace One way describing this Duke Kentucky modeled what system looks without solar and with solar and \$794.08 and \$770.02 reduction in cost of service with adoption of solar?

10:28:10 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace KYSEIA Hearing Exhibit 9, Exhibit 3 contains information of Duke Kentucky average usage from solar, Exhibit 9 is extract BLS-2 matched information for 12CP coincident demand peak, date and hour, look familiar?

10:28:11 AM KYSEAI HEARING EXHIBIT 9
Note: Sacre, Candace ATTY SPENARD KYSEIA - WITNESS SAILERS
Note: Sacre, Candace CASE NO. 2023-00413 ATTACHMENT BLS-2 PAGE 1 OF 1

10:31:31 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace When examine for June 29 2021 hour 16, amount represent presolar usage for average customer?

10:32:10 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	Move to right, PVWatts model projected for generator of facility that size 7.0815 generate 3.9175?
10:32:33 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	Customer generate more power than average customer use, exporting, in red. 1.375 non, model value of energy customer sending out to system during hour?
10:33:12 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	When look at number, customer with solar net exporter?
10:33:24 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	Column M, value is zero for month 6, see that?
10:33:52 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	Why zero in column?
10:34:12 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	Consumed from grid zero, but as net exporter send out energy to grid?
10:34:27 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	For that customer, why that number not negative rather than zero?
10:35:31 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	When you say akin to purchase power, more granular about how Duke Kentucky treat?
10:36:22 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	In terms of May 24, hour 17, is day and hour of highest system load that month from study period?
10:37:38 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	Generally case when temperature high or several hot days in a row?
10:37:59 AM	Chairman Chandler Note: Sacre, Candace	Procedural discussion. (Click on link for further comments.)
10:38:18 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Examination. Page 1 of 122 BLS-2, four tables, is 12CP demand kW average kW or peak kW?
10:38:40 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	12CP demand kW on that table?
10:38:48 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Average hourly demand or peak demand in that hour?
10:39:06 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Here, calculating what COSS is assuming determinants on equal footing to billing units?
10:39:30 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Dollar per kW charged average kW over single month in first table?
10:40:03 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Only within that hour?
10:40:09 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	By month, within a single hour?
10:40:13 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Average within hour in which hour was peak?
10:40:25 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Load 15-minute profiles if wanted, not a data issue?
10:40:35 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Customers paying tens of millions of dollars for meters that give utility data on 15-minute bases?
10:40:59 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Charge demand rates on hourly average of peak for hour coincident with system?

10:41:22 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Differently than how did this calculation?
10:41:29 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	When say group coincident demand, really group peak demand, not relative to anything else, just group demand?
10:41:53 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Coincident presumes occurring alongside or relative something else?
10:42:01 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Just peak for entire class?
10:42:04 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Second column is class, their usage, at same time as systems peak in each one of months?
10:42:18 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Only use of peak demand for group or coincident peak demand on 12CP basis is to identify hours of peak, after that is on group intrahour demand on average in that hour?
10:43:16 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	For DEOK customers across both territories, load profiles not DEK specific, are DEOK?
10:43:36 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Said across Ohio and Kentucky, is that not the case?
10:43:48 AM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Average load profiles used in CCOSS is DEK customers?
10:44:04 AM	Chairman Chandler Note: Sacre, Candace	Want to talk about exhibit?
10:44:08 AM	Atty Spenard KYSEIA Note: Sacre, Candace	Marked as KYSEIA Hearing Exhibit 10, two pages from attachment, Response, KYSEIA Request 2, Item 9, pages 81 and 82 of 205, stopping point.
10:44:09 AM	KYSEIA HEARING EXHIBIT 10 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 1 PAGES 81 AND 82
10:45:25 AM	Chairman Chandler Note: Sacre, Candace	Recess until 11.
10:45:39 AM	Camera Lock PTZ Activated	
10:45:46 AM	Session Paused	
11:01:02 AM	Session Resumed	
11:01:03 AM	Camera Lock Deactivated	
11:01:09 AM	Chairman Chandler Note: Sacre, Candace	Back on the record.
11:01:18 AM	Chairman Chandler Note: Sacre, Candace	Mr. Spenard, continue?
11:01:23 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	Cross Examination (cont'd). KYESIA Hearing Exhibit 10, two pages, attachment 1 shows model solar generation output used in direct testimony BLS-2, correct?
11:02:24 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	KYSEIA Hearing Exhibit 10, pages 81 and 82 of 205, includes May 24 hour zero begins near bottom and extends to next page, Exhibit 2, May 24 2021 hour 18, residential rate group, group peak demand?
11:03:31 AM	Atty Spenard KYSEIA - witness Sailors Note: Sacre, Candace	Move over to system coincident demand also May 24 2021 hour 17?

11:03:44 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace System coincident demand column consistent with 12CP value for May?

11:03:55 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Exhibit 10, second page, May 24, row for hour 16, consistent with hour 12CP that day, final column on right, value of 0.6463, see that?

11:04:45 AM Chairman Chandler
Note: Sacre, Candace Said 16 or 18? (Click on link for further comments.)

11:05:20 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Cross Examination (cont'd). Hour 16, value of 0.6463, see that?

11:06:00 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Attachment 1, solar generation calculator from PVWatts?

11:06:20 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace In testimony earlier PVWatts uses EST?

11:06:37 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace When look at hours, hour for PVWatts moves from zero through 23, correct?

11:07:25 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Exhibit 4, page 177 of 187, numbering system for hours of day for Attachment 2 for usage run 1 through 24, is that your understanding?

11:07:59 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace When talk about Attachment 2, when see entry for March 12 2022 hour 1, correspond midnight to 12:59 am?

11:08:47 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace When look at PVWatts, on May 24, has as first hour zero, see that, zero through 23, confirm that?

11:09:31 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace With regard to looking at May 24 entry for hour zero, block of time midnight and 1 am for that day?

11:10:14 AM Atty Spenard KYSEIA
Note: Sacre, Candace Post-hearing data request ask for DEK provide narrative explains how numbers on PVWatts model for May 24 zero to 23 match up to numbers on Attachment 2, May 24, 1 through 24.

11:10:15 AM POST-HEARING DATA REQUEST
Note: Sacre, Candace ATTY SPENARD KYSEIA - WITNESS SAILERS
Note: Sacre, Candace EXPLAIN HOW NUMBERS ON PVWATTS MODEL FOR MAY 24 ZERO TO 23 MATCH UP TO NUMBERS ON ATTACHMENT 2

11:11:40 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Examination. Hour ending at midnight previous day or current day?

11:12:13 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Hearing Exhibit 10, not just give hours, gives days?

11:12:24 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace First one, have May 22, May 23, see that?

11:12:31 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Only logical conclusion 5/22, hour 23, starting 23, next one is the next day?

11:13:19 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace After middle of March, that would mean, if skips an hour, that hours post-March off one, agree?

11:13:35 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace March skips an hour for your data?

11:13:42 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Exhibit 4, not happen at midnight, March 13?

11:14:08 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Expect extra hour or opposite implication in fall?

11:14:32 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Interval data has 8,760 hours?

11:14:44 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Exhibit 4 represent 8,760 hours?

11:15:31 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Know not a leap year?

11:15:45 AM Chairman Chandler - witness Sailers
Note: Sacre, Candace Said not know how treats moving back to EST in the fall?

11:16:02 AM Chairman Chandler
Note: Sacre, Candace Mr. Spenard?

11:16:08 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Cross Examination (cont'd). Exhibit 10, second page, May 24, hour 16, AC system output kW, see that column?

11:16:55 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace See value of 0.6463?

11:17:11 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace On that day and hour, PVWatts system calculator produced 0.643?

11:17:33 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Back up, move left, column plane of array iridescence, see that?

11:17:48 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Explain what that means, what column is reflecting?

11:18:00 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace May 24, hour 16, array iridescence 121.584?

11:18:40 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace How does number value for hour 16, May 24, how stack up with other numbers?

11:19:41 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Confirm for that date and hour, May 24, hour 16, ambient temperature column, see that?

11:20:10 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Value for May 25, hour 16, of 19, that's what PVWatts calculator temperature for model correspond with system output?

11:20:43 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace When looking at May 24 2021, hour 16 or 17 or 18, study take into account actual weather service territory experiencing during those hours?

11:22:33 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Direct testimony, page 10, Table 3, COSS Values Rate RS and Rate DS, row for demand, unit cost for RS \$29.42, see that?

11:23:39 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace If 12CP demand for month be reduced by one kW for that hour, demand component for COSS fall by \$22.32?

11:24:48 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace COSS based on 12CP, correct take every day of year and hours for that day, from that pick put one value for each month of day have system peak?

11:25:51 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace In situation in which solar generator customer is exporting more energy than solar generator using, solar generation customer exporting energy, if hit during peak hour in 12CP, what impact have on analysis?

11:28:01 AM Atty Spenard KYSEIA - witness Sailers
Note: Sacre, Candace Reducing usage on kW basis to zero, reducing \$29.42 per kW?

11:28:32 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Participants in customer generators compared to customers in rate RS, entire residential class exporting power during the 12CP?
11:30:02 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In terms of \$29.42 number in Table 3, using to demonstrate or approximate impact on COS results for a 1 kW the impact of solar generation?
11:30:46 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	When customer becomes net exporter and hits in 12CP hour, is treatment to create a floor of zero?
11:31:47 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In analysis, what value Duke Kentucky place on net exporter that hits net exporting during a 12CP hour?
11:33:11 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	On page 24, direct, line 5, provide company proposed avoided cost amount ACEGC, last row Table 5 middle column, 0.057132, see that amount?
11:34:27 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Does this represent Duke Kentucky proposal for compensating customer to grid per kWh?
11:34:46 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	With regard to nonresidential value of 0.057463 per kWh, proposal for nonresidential?
11:35:10 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In terms of two values, include avoided energy?
11:35:16 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Include ancillary services?
11:35:20 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Include generation?
11:35:23 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Include anything else that does not appear on Table 5?
11:36:21 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	ACEGC rate proposed in Table 5, .057132, compare to energy cost in Table 3, see value of 0.06797, different numbers, compare and look at credit on Table 5 and compare energy cost Table 3?
11:38:12 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Table 3 solar customer as net exporter, zone reducing cost reflective in COS and reducing demand towards zero, get \$22.42 per kW?
11:38:41 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Once hit zero, number switches over to energy, that 0.046797, correct?
11:39:28 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Analysis based on average customers?
11:39:58 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Attachment to direct BLS-2, far left, average customer usage?
11:40:25 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Of those average customers, how many people in KY_RS group are solar generators?
11:41:53 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In instances in which customer with solar generating, nonsolar customers would be importing energy during same hours?
11:43:18 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Net importing power during 12CP?
11:43:41 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	When residential customer exporting, where energy go?

11:45:16 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	One more exhibit marked as KYSEIA Hearing Exhibit 11, two pages, first page from Sailers direct, two easier to read, when read across left to right, far left-hand corner, entries for June 29, see those?
11:45:18 AM	KYSEIA HEARING EXHIBIT 11 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENDARD KYSEIA - WITNESS SAILERS CASE NO. 023-00413 ATTACHMENT BLS-2 PAGE 28 OF 112 AND PAGE 1 OF 1
11:47:03 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	For residential KY_RS, June 29 hour 16 information corresponds as read across left to right, analysis present show a residential customer solar to be net exporter of energy?
11:47:56 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	In terms of 2.5416, see that number?
11:48:18 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Regard to June 29 hour 16, Exhibit 9, pulled out separately to reflect value 12CP date and hour?
11:49:05 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Explain what 2.5416 means on Attachment BLS-2?
11:49:37 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	To confirm 2.5416 usage that hour, to the right says zero, zero to prevent reflecting negative rate in that cell?
11:50:30 AM	Atty Spenard KYSEIA - witness Sailers Note: Sacre, Candace	Confirm essentially zero reflect in study put forth net export during 12CP event hour go to zero but never go negative?
11:51:40 AM	Atty Spenard KYSEIA Note: Sacre, Candace	Post-hearing data requests. (Click on link for further comments.)
11:51:41 AM	POST-HEARING DATA REQUEST Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS RECONCILIATION OF PVWATTS HOUR INFORMATION TO USAGE HOUR INFORMATION
11:52:10 AM	POST-HEARING DATA REQUEST Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS COMPARE TOTAL NUMBER OF HOURS USED FOR PVWATTS CALCULATOR ANALYSIS RESULTS TO DUKE KENTUCKY RESULTS PRESENTED FOR USAGE
11:52:29 AM	Atty Spenard KYSEIA Note: Sacre, Candace	Tendered eleven exhibits, KYSEIA, move introduction.
11:53:49 AM	Chairman Chandler Note: Sacre, Candace	So moved, KYSEIA Hearing Exhibits 1 through 11.
11:53:50 AM	KYSEIA HEARING EXHIBIT 1 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 ATTACHMENT BLS-2 PAGE 111 OF 112 INPUTS FOR CALCULATIONS
11:53:52 AM	KYSEIA HEARING EXHIBIT 2 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEIA-DR-02-011 ATTACHMENT PAGE 86 OF 116 MONTHLY STATISTICS RS RATE GROUP APR 2021 THROUGH MAR 2022
11:53:53 AM	KYSEIA HEARING EXHIBIT 3 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 ATTACHMENT BLS-2 PAGE 2 OF 112
11:53:55 AM	KYSEIA HEARING EXHIBIT 4 Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS

	Note: Sacre, Candace	CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 2 PAGE 177 OF 187
11:53:56 AM	KYSEIA HEARING EXHIBIT 5 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 1 PAGE 41 OF 205
11:53:57 AM	KYSEIA HEARING EXHIBIT 6 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS NATIONAL RENEWABLE ENERGY LABORATORY PWWATTS VERSION 5 MANUAL
11:53:58 AM	KYSEIA HEARING EXHIBIT 7 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 2 PAGE 1 OF 187
11:53:59 AM	KYSEIA HEARING EXHIBIT 8 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEAI-D-02-009 ATTACHMENT 2 PAGE 28 OF 187
11:54:00 AM	KYSEIA HEARING EXHIBIT 9 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 ATTACHMENT BLS-2 PAGE 1 OF 1
11:54:01 AM	KYSEIA HEARING EXHIBIT 10 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 1 PAGES 81 AND 82
11:54:02 AM	KYSEIA HEARING EXHIBIT 11 Note: Sacre, Candace Note: Sacre, Candace	ATTY SPENARD KYSEIA - WITNESS SAILERS CASE NO. 023-00413 ATTACHMENT BLS-2 PAGE 28 OF 112 AND PAGE 1 OF 1
11:54:03 AM	Chairman Chandler Note: Sacre, Candace	Recess until 12:50.
11:54:33 AM	Camera Lock PTZ Activated	
11:54:34 AM	Session Paused	
1:01:02 PM	Session Resumed	
1:03:22 PM	Session Note Entry	
1:03:35 PM	Session Paused	
1:04:59 PM	Via Presentation Activated	
1:05:01 PM	Session Resumed	
1:05:28 PM	Chairman Chandler Note: Sacre, Candace	Back on the record.
1:05:31 PM	Atty Gary Joint Intervenors - witness Sailers Note: Sacre, Candace	Cross Examination. Involved in other cases net metering, generally aware?
1:05:34 PM	Via Presentation Deactivated	
1:06:03 PM	Atty Gary Joint Intervenors - witness Sailers Note: Sacre, Candace	Referenced them in testimony and responses, so if refer to Kentucky Power case, aware what referring to?
1:06:13 PM	Atty Gary Joint Intervenors - witness Sailers Note: Sacre, Candace	If refer to LG&E/KU cases, aware what referring to?
1:06:21 PM	Atty Gary Joint Intervenors - witness Sailers Note: Sacre, Candace	Kentucky Power decision 2020-00174, sound right?
1:06:30 PM	Atty Gary Joint Intervenors - witness Sailers Note: Sacre, Candace	And LG&E and KU cases were -00349 and -00350, same year 2020?

1:06:44 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Generally aware of cases?

1:07:00 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Commission laid out principles how net metering 2 be set up?

1:07:08 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Recall them off the top of your head?

1:07:15 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Number of avoided costs, Commission laid out principles, evaluating eligible facilities as utility size system or supply side resource?

1:07:29 PM Atty Vaysman Duke Kentucky
Note: Sacre, Candace Have a copy?

1:07:42 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Responded to what principles were in response to one of data requests?

1:07:56 PM Atty Gary Joint Intervenors
Note: Sacre, Candace If wanted to hand him a copy of response to JI Request No. 4. (Click on link for further comments.)

1:08:08 PM Via Presentation Activated

1:08:40 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Asked if aware of principles generally, laid out principles and how company treated each in its filing?

1:09:05 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Principles were evaluating them as supply side resource, treating benefits and cost symmetrically?

1:09:25 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Commission required conduct forward-looking, long-term incremental analysis, right?

1:09:34 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Avoid double counting?

1:09:41 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Ensure transparency?

1:09:45 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Commission addressed how each treated?

1:09:50 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Transparency one of key principles prior orders, referred specifically to 2021-00074, same principles discussed elsewhere?

1:10:00 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Read Response 5(a) how ensure transparency?

1:10:23 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Went through a number of stakeholder engagement discussions, right?

1:10:32 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Were involved in both of those?

1:10:34 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace In person or virtual, or how conducted?

1:10:40 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Invited a number of stakeholders?

1:10:53 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Intended be discussion?

1:11:46 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Overall purpose, stakeholder engagement meetings, both Apr 19 and Jun 29, sounds right?

1:11:59 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Purpose, in part, address Commission's Order to ensure transparency?

1:12:44 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Part of it discuss what happens after cap, explain?

1:13:06 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Define cap?

1:13:15 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Have constructive and open communication, back and forth?

1:13:50 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace On agenda, Response, Joint Intervenor 1-13, gave presentations that gave during two meetings as attachments?

1:14:17 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace One up now April 19th one?

1:14:24 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Attachment 1, same thing, on agenda terms NEM 1.0?

1:15:00 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Structured to comply with KRS 278.465, refers to NEM 1.1 refers to what in application be NMS 2?

1:15:15 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Rider NM-2, sorry, and also on agenda post cap solar program for after one percent cap discussed?

1:15:33 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Gathered input from stakeholders?

1:15:42 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Heard preferences?

1:15:49 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Direct testimony in front of you, right?

1:16:07 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Referred to main themes heard from them?

1:16:12 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Some of themes stakeholders prefer monthly kWh netting?

1:16:18 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Direct, pages 6 and 7, not have specific line?

1:16:36 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Heard stakeholders believe should consider impacts of new technology?

1:16:47 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Simple rules preferred?

1:16:53 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Should be transition periods and grandfathering?

1:16:57 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Consider future potential through augmented demand response?

1:17:09 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Still have JI 1-13 with you?

1:17:20 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Stated considered stakeholder input as well as stakeholder precedent?

1:17:29 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace How consider stakeholder input?

1:17:42 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Any changes made to finding as result of input?

1:18:38 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Main way considered feedback was keep it simple?

1:19:15 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace One of other things heard consider impacts of new technology?

1:19:33 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace In presentation, Attachment 1, page 15, also proposed framework for solution?

1:20:07 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Part of that ensuring reasonable returns for adopters?

1:20:28 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Also mentioned on last page new EE/DG program, EE energy efficiency?

1:20:41 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace DG be distributed generation?

1:20:44 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Stated that, reading (click on link for further comments), right, second bullet point from top?

1:20:58 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Company taken steps along that line as part of filing?

1:21:06 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace In general?

1:21:31 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Are a few looked up, Improve and Save, help pay upgrades as part of bill, sound familiar?

1:21:50 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace EnergyWise program, rewards shifting away from peak periods?

1:22:05 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Power Care Pilot Program?

1:22:21 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Power Care Pilot Program, remember anything specifically?

1:22:50 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Has Duke Kentucky explored implementing programs similar to those?

1:23:44 PM Via Presentation Deactivated

1:23:59 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Also stated direct testimony, page 6, some stakeholders prefer monthly kWh netting smooths out benefits among customers?

1:24:21 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace From some stakeholders?

1:24:23 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace More than one?

1:24:34 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Recall anyone disagreeing or expressing interest another way?

1:24:49 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Also presentation 2, June presentation, laid out excess of generation, at least a slide on that?

1:25:15 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Slide, page 9 of 17, Attachment 2?

1:25:32 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Discussed how dollar value be set?

1:25:42 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Second part, not from Commission order?

1:26:20 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Heading page 9 of 17, filing topics?

1:26:28 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Showing stakeholders how deal with each of those filing topics?

1:26:48 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Was any other possible way presented?

1:26:59 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Any other analysis shared with stakeholders?
1:27:10 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	If not some other method for dealing with other avoided costs, not one presented to stakeholders?
1:28:00 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Looking at avoided costs, in presentation mentioned Duke plans energy costs be consistent with IRP inputs?
1:28:22 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Ancillary services and environmental costs be imbedded in energy costs above?
1:28:35 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Carbon tax projections consistent with IRP inputs be used?
1:28:47 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Transmission and distribution, evaluating value to include for transmission benefits and distribution benefits?
1:28:59 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	No option presented on those?
1:29:35 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Not discussed also was FERC Order 2222?
1:30:56 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Response to Joint Intervenors 1-4 and consideration of principles laid out by Commission, how Duke Kentucky ensured transparency use publicly available information?
1:31:40 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	And where appropriate uses publicly available information?
1:31:51 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Direct, page 19, Commission expressed preference for net cone for avoided generation capacity costs?
1:32:21 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Do not propose use net cone for avoided capacity?
1:32:30 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	In rebuttal, do propose use updated ELCC for fixed tilt solar from PJM?
1:33:22 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Rebuttal, note on page 11 PJM released revised ELCC values for fixed solar use in '25-'26 residual auction, revising 31 percent to nine percent?
1:33:46 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	No citation or footnote on there, correct?
1:34:41 PM	Atty Gary Joint Intervenors Note: Sacre, Candace	In questions to Joint Intervenor is cited a single-page document. (Click on link for further comments.)
1:34:50 PM	Via Presentation Activated	
1:35:37 PM	Chairman Chandler Note: Sacre, Candace	Would you like to mark this, counsel? (Click on link for further comments.)
1:35:38 PM	JOINT INTERVENORS HEARING EXHIBIT 1 Note: Sacre, Candace Note: Sacre, Candace	ATTY GARY JOINT INTERVENORS - WITNESS SAILERS ELCC CLASS RATINGS FOR THE 2025/2026 BASE RESIDUAL AUCTION
1:35:40 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	Document look familiar?
1:35:50 PM	Atty Gary Joint Intervenors - witness Sailors Note: Sacre, Candace	What referring to in rebuttal regarding revised ELCC?

1:35:59 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Shows ELCC class ratings for variety of capacity resources?

1:36:08 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Covers storage options with updated ELCC, nuclear, coal, combined cycle gas?

1:36:30 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Combustion turbines without dual fuel and with?

1:36:36 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Document at top references FERC number?

1:36:55 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Read that order?

1:37:00 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Familiar what's in it?

1:37:19 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Not familiar what proposed by PJM?

1:37:28 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Came out of revised methodology proposed?

1:37:38 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Not familiar with what changed?

1:38:06 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace When filed rebuttal, applied updated ELCC to peaker methodology to get revised number?

1:38:38 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Generally familiar with net cone and how set?

1:38:52 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace ELCC numbers used in setting net cone values?

1:39:00 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Not sure on the interplay between those parts?

1:39:10 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Updated peaker numbers provided to you by Kalemba as well?

1:39:26 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace When method updated, know when that was done?

1:40:02 PM Via Presentation Deactivated

1:40:29 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Mentioned in rebuttal changes to statutes during session?

1:40:46 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Follow legislative session?

1:40:55 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Things that apply to utilities, followed that somewhat?

1:41:10 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Mention updates KRS 278, 262, and 264, aware what's there?

1:41:30 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Aware adds new definitions?

1:41:46 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Aware creates new energy planning and inventory commission?

1:42:06 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Aware proposing retire facilities required give notice to new commission?

1:42:33 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Not referring to statutes, define intermittent?

1:43:22 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Something intermittent not available when called upon if needed?

1:43:52 PM Atty Gary Joint Intervenor - witness Sailors
Note: Sacre, Candace Rooftop solar intermittent not call on it when sun not shining?

1:44:06 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace There is intermittent and dispatchable, can have resource not intermittent and also not dispatchable?

1:44:34 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Following 349, Duke took position on 349?

1:44:47 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Not aware in following 349 before that?

1:44:57 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Know who Amy Spiller is?

1:45:14 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Said provided document last night, one I filed?

1:45:18 PM Atty Gary Joint Intervenors
Note: Sacre, Candace Hand out, have marked as JI 2.

1:45:19 PM JOINT INTERVENORS HEARING EXHIBIT 2
Note: Sacre, Candace ATTY GARY JOINT INTERVENORS - WITNESS SAILERS
Note: Sacre, Candace LETTER DATED MARCH 25 2024 TO HONORABLE DAVID OSBORNE FROM AMY B SPILLER REGARDING SB 349

1:45:22 PM Via Presentation Activated

1:45:57 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Look familiar to you?

1:46:06 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Without reading whole thing, letter from Ms. Spiller to Osborne?

1:46:18 PM Atty Vaysman Duke Kentucky
Note: Sacre, Candace Objection, to relevance of letter. (Click on link for further comments.)

1:47:28 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace On page 2, first full paragraph, letter states, reading (click on link for further comments), see that?

1:48:30 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Reading (click on link for further comments), right?

1:48:43 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Agree uneconomic plants not reliably dispatch power?

1:48:50 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace As coal plants age become more intermittent?

1:49:13 PM Chairman Chandler
Note: Sacre, Candace Overrule objection.

1:49:25 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Solar is intermittent?

1:49:25 PM Via Presentation Deactivated

1:49:40 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Did some modeling of solar?

1:50:07 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace PVWatts specifically, modeled solar production using PVWatts?

1:50:29 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Also can model how much gas plant able produce over given set of years?

1:50:47 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Generally, also can track load from year to year?

1:51:00 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Presented in response to a number of data responses load tracking is part of record?

1:51:18 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Track down to month, said even down to 15-minute increment, very granular level?

1:51:46 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Can not just tract but use that and other data to model load?

1:52:09 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Have load forecasting group?

1:52:20 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Model what load expected to be?

1:52:30 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Use to make decisions about capacity needs and energy needs?

1:52:41 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Including capacity, energy, distribution, transmission, all require load forecasting, planning process is for all those?

1:53:18 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Capacity, energy, distribution, transmission, IRP?

1:53:46 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace In talking to Spenard talked about how compared load tracked to model solar and got export value?

1:54:12 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Export value was model production from solar minus load consumed and either positive balance out to grid or zero?

1:54:25 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Exports equal generation minus load used by facility?

1:54:39 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Exports generation minus load?

1:54:45 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Modeled generation?

1:54:48 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace And modeled load?

1:54:55 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Electric rates greatly impact economic development?

1:55:16 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Electric rates impact economic development?

1:55:25 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace All other things equal, can have an impact on economic development?

1:55:32 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Offer economic development rates>

1:55:45 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Involved in analysis marginal costs versus revenues?

1:55:55 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Had cause to look at broader regional impacts?

1:56:20 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Ever had opportunity to look at broader regional impacts of rates generally?

1:56:34 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Ever had cause to use IMPLAN model?

1:56:45 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Ever had cause other regional input/output modeling system impact rates be on economic developments?

1:57:05 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Used JEDI model?

1:57:09 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Familiar with JEDI model?

1:57:14 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Not aware JEDI model prior to this proceeding?

1:57:17 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Not consider using it?

1:57:23 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Not consider IMPLAN model?

1:57:28 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Regard job creation, presentation to stakeholders, Joint Intervenor 1-13, list of avoided costs Attachment 2 listed avoided costs, no method of evaluation proposed in other cases?

1:58:55 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Not conduct any analysis?

1:59:03 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Aware Commission ordered job benefits and economic development be considered in these net metering proceedings?

1:59:29 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Based compensation rates on 25-year horizon?

1:59:33 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace Not made determination process for updating compensation rate?

1:59:58 PM Atty Gary Joint Intervenors - witness Sailers
Note: Sacre, Candace No future deadline know be reevaluated?

2:00:14 PM Chairman Chandler
Note: Sacre, Candace Commission Staff?

2:00:18 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Cross Examination. As aside, pick up on something Gary asked, mentioned you and Kalemba worked to calculate avoided capacity costs?

2:00:54 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Spoke with counsel, Staff intends ask post-hearing clarify differences in schedules tendered in 2022-00372 and, in turn, in this case related to avoided capacity cost calculations. (Click on link for further comments.)

2:00:55 PM POST-HEARING DATA REQUEST
Note: Sacre, Candace ASST GEN COUNSEL TUSSEY PSC - WITNESS SAILERS
Note: Sacre, Candace CLARIFY DIFFERENCES IN SCHEDULES TENDERED IN 2022-00372 AND 2023-00413 RELATED TO AVOIDED CAPACITY COST CALCULATIONS

2:01:32 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Tariffs in general, if read, reading (click on link for further comments), would apply to any aggregation performed by someone other than Duke?

2:02:32 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace But that's not what it says, what you intended it to be, only rooftop solar?

2:03:05 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Prohibit aggregation amongst generator unless Duke acting as aggregator?

2:03:35 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace When you say that, what do you mean by double counting?

2:03:57 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Understand generally, apply it in your description to these circumstances?

2:04:51 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace View that be case for both riders, customers compensated differently under both riders?

2:05:26 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace For you, that's interchangeable in this circumstance?

2:05:35 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Particular PJM or FERC order direct me to that would address double counting?

2:06:26 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Talked about compensation looks different under each tariff?

2:06:36 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Net metering 1 customers receive a one-to-one kW credit?

2:06:55 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace While receive lower bill, not receive dollar amount credit like Net 2 customers will?

2:07:10 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Agree not the same thing?

2:07:17 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Explain why if Duke is aggregator it is okay for aggregation occur?

2:08:05 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Although carved out exception in both riders, saying today Duke not identified benefit to company?

2:09:14 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace If make a change, reading (click on link for further comments), be removed from participation in net metering?

2:09:55 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Say potentially but talk about requires new interconnection study, at what point become removal, at what point Duke say have to shift to Net Metering 2?

2:10:51 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace At what point does it become are changing from Net Metering 1 rider to customer receiving service under Net Metering 2 rider, application process or interconnection study?

2:11:25 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace For sure after interconnection study?

2:11:32 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Intended have leeway for you, increase ends up being extremely minimal, any way remain on Net Metering 1?

2:11:55 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace Any circumstance see customer forced to change from Net Metering 1 to Net Metering 2 tariff or just removed from Net Metering 1 tariff?

2:13:07 PM Asst Gen Counsel Tussey PSC - witness Sailers
Note: Sacre, Candace If somebody asked what company view as material increase, any standards going to apply?

2:13:41 PM Chairman Chandler
Note: Sacre, Candace Move Joint Intervenors 1 and 2? (Click on link for further comments.)

2:13:42 PM JOINT INTERVENORS HEARING EXHIBIT 2
Note: Sacre, Candace ATTY GARY JOINT INTERVENORS - WITNESS SAILERS
Note: Sacre, Candace LETTER DATED MARCH 25 2024 TO HONORABLE DAVID OSBORNE FROM AMY B SPILLER REGARDING SB 349

2:14:36 PM Chairman Chandler
Note: Sacre, Candace Vice Chair?

2:14:40 PM Vice Chairman Hatton - witness Sailers
Note: Sacre, Candace Examination. Look at public comments in this proceeding?

2:14:57 PM Vice Chairman Hatton - witness Sailers
Note: Sacre, Candace Complaining about changes to billing for net metering customers, know what referring to?

2:15:52 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace Explain to me how net metering customers bills change if new rider approved?

2:16:40 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace What if new rider approved?

2:16:58 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace What is purpose of that, the change?

2:17:14 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace Because statutes have changed?

2:17:21 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace Customers seem to like it, absolutely necessary bills change?

2:17:32 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace Which changes?

2:17:57 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace In some answers Duke provided told 98 customers currently queued 110 now waiting thirteen approved, 97 waiting applied in time to get NM1 rate or does it matter when apply or when approved?

2:18:56 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace If applied, not have facility in service?

2:19:03 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace Know what taking so long, what hold-up?

2:19:12 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace Listed as a witness today?

2:19:41 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace What overall reason asking for change to have Net Metering 2 rider?

2:20:03 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace And particular terms of Net Metering 2, reason would be comply with statutes?

2:20:14 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Examination. Not obligated to seek successor net metering rate, right?

2:20:26 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Answered question obligated under statutes?

2:21:15 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Taken away with any conversation obligated to file this case or have a choice to update net metering rates consistent with statute?

2:21:38 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace That's very different, made a choice, not required to?

2:22:04 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Under impression from conversations had and work done, Duke Kentucky Not provide Net Metering 1.0 until meet cap?

2:22:28 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Made a conscious choice?

2:22:34 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Could have initiated it a year before, probably two years before?

2:22:53 PM Vice Chairman Hatton - witness Sailors
Note: Sacre, Candace Examination. Why need Net Metering 2, why not continue under Net Metering 1?

2:23:23 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Examination. Self-imposed deadline?

2:23:30 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace What was date of order discussing where believe FERC said NM1.0 customers cannot participate as DERs as part of DER aggregation?

2:23:54 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	PJM made compliance filing on Sept 1 2023?
2:23:58 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Know if accepted by Commission?
2:24:06 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	File tariffs, when Commission has open case here and Duke Kentucky files tariff, go by what tariff said when filed or approved tariff and what Commission order says when accepted and ruled upon?
2:24:28 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	When a tariff is submitted, does proposed tariff speak for itself as being rule or approved tariff and what the Commission says in approving tariff?
2:24:42 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Do you know if Commission ruled on that filing and if so what said?
2:24:50 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Sept 1 filing, whether FERC has ruled on the Sept 1 2023 filing made by PJM regard what talk about as double counting?
2:25:13 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Know whether makes distinction being credited for something verse having provided service?
2:25:30 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Aware whether filing makes distinction between being credited for service as part of retail program verse providing service as part of retail program?
2:26:23 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Language matters because reading from Tariff Attachment K and Section 1.4 (b)(h) Operating Agreement, reading (click on link for further comments), that's the subject were discussing when talk double counting pursuant to Order 2222, correct?
2:26:48 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Originally, Sept 1 filing, previously said, reading (click on link for further comments), propose to change as markup, used to say credited, now says provided, aware of distinction?
2:27:59 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Think that mattered?
2:28:17 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	NM2 calls out a credit for services of energy, capacity, and ancillary services?
2:28:34 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	What is value stack for NM1 credits?
2:28:43 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Does crediting a customer under NM1 avoid utility purchasing corresponding ancillary services?
2:29:11 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Providing a credit under NM1 avoid corresponding capacity?
2:29:40 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Post-hearing assuming tariff is approved by FERC how believe NM1 complies with rules set forth in PJM tariff and operating agreement, provided verse credited?
2:29:41 PM	POST-HEARING DATA REQUEST Note: Sacre, Candace Note: Sacre, Candace	CHAIRMAN CHANDLER - WITNESS SAILERS ASSUMING TARIFF APPROVED BY FERC, HOW BELIEVE NM1 COMPLIES WITH RULES SET FORTH IN PJM TARIFF AND OPERATING AGREEMENT

2:30:18 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Take a look at tariff as how describes provided for now and how FERC provided clarification on what service is and is not provided and net benefits test used to determine that.
2:30:42 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	In presentations made in April and June, items refer to filing topics A through H of generation credit, eight different types of compensation?
2:31:18 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Excess generation credit, energy, ancillary services, environmental, carbon capacity, A through H, originally says, reading (click on link for further comments), is that what ultimately filed?
2:31:39 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Ancillary services, reading (click on link for further comments), what was filing relative what projected in this group?
2:32:10 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Environmental, reading (click on link for further comments), what end up doing?
2:32:22 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Say is embedded, in what regard is that embedded in the energy?
2:32:44 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Carbon, says here, reading (click on link for further comments), what end up doing in that regard?
2:33:06 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	So different than what proposed in this presentation?
2:33:18 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Old IRP, current IRP, also in June of last year position was to propose depreciation rates in rate case consistent with IRP?
2:33:38 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Moved off that now?
2:33:56 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Not take part in integrated resource planning case, did you?
2:34:00 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Used capacity peaker method consistent with assumptions in IRP, did do that?
2:34:12 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Ever ask to make IRP filing or rate case filing part of this case?
2:34:24 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Used peaker method along with that case and took entire COSS based off approved revenue requirement as basis for filing this case?
2:34:58 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Are they completely different methodology or increase it by inflation but used the same peaker reference unit?
2:35:21 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Most of DSM cases eight years just been reference from 2016, think that's what you used?
2:35:44 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Done a number of DSM cases, not remember what unit is?
2:35:54 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Transmission, reading (click on link for further comments), determination not appropriate value?
2:36:06 PM	Chairman Chandler - witness Sailors Note: Sacre, Candace	Distribution, reading (click on link for further comments), determined no appropriate value?

2:36:15 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Job creation, reading (click on link for further comments), correct?

2:36:23 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Reference LG&E/KU case, reason Commission didn't just not not enough data?

2:36:38 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace For job creation, said Commission not make determination because not enough data due to small number installations available?

2:37:35 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Latter thing said very circular, not do it because Commission not made someone else do it, we can't be made to do it?

2:38:12 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Not sure, but didn't study it?

2:38:16 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Hard to find something out if not looking?

2:38:24 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Reason said not require does that necessarily apply Duke assuming run up to one percent cap next year?

2:38:48 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Same case with Duke, have lack of data number of installations or size have of net metering customers have?

2:39:13 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Waiting for us to tell you what methodology to use?

2:39:38 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Basis for deciding it would not is what?

2:39:55 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Opposite reason you said not require LG&E/KU not have enough signed up, saying got too many signed up and about to be fully subscribed?

2:40:37 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Whether behind meter generation valued as resource for purposes of PJM and FRR plan or valued as load reduction, Swez best person clarify?

2:41:28 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Do DSM work as well?

2:41:46 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace If told customers turning off electricity make money if turn off at that hour as opposed different hour, seem rational try to move usage, reduce demand in hours given greatest credit?

2:42:31 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Did all this work and presumption customers with rooftop solar effectively identical to average residential customer, takeaway from data?

2:42:54 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Net kWh effectively same between two groups?

2:43:11 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Testimony indicates average rooftop solar and average residential use about same kWh?

2:44:31 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace One percent difference?

2:44:41 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Assuming proposal implemented, for every kWh exported compensated at certain dollar per kilowatt hour?

2:44:56 PM Chairman Chandler - witness Sailors
Note: Sacre, Candace Every dollar consumed not exported effectively avoiding retail rate?

2:45:10 PM Chairman Chandler - witness Sailers
Note: Sacre, Candace Retail rate is higher than net metering rates compensation?

2:45:19 PM Chairman Chandler - witness Sailers
Note: Sacre, Candace Post-proposal incentive to customers to use electricity that attempts avoid retail rate as opposed to exporting excess?

2:45:55 PM Chairman Chandler - witness Sailers
Note: Sacre, Candace Does that change demand profile of that customer relative to nongenerating customer?

2:46:24 PM Chairman Chandler - witness Sailers
Note: Sacre, Candace If reasonable takeaway, does page 1 of BLS-2 miss that?

2:47:10 PM Chairman Chandler - witness Sailers
Note: Sacre, Candace Rational to assume something like that likely occur?

2:47:34 PM Chairman Chandler - witness Sailers
Note: Sacre, Candace Know what all-in kWh rate is on average?

2:47:42 PM Chairman Chandler - witness Sailers
Note: Sacre, Candace What is kWh compensation proposing?

2:47:51 PM Chairman Chandler - witness Sailers
Note: Sacre, Candace Two-to-one difference, getting double value if consume energy?

2:48:03 PM Chairman Chandler
Note: Sacre, Candace Recess until 3 o'clock.

2:48:31 PM Camera Lock PTZ Activated

2:48:34 PM Session Paused

2:48:48 PM Session Resumed

2:49:43 PM Session Paused

3:01:41 PM Session Resumed

3:02:03 PM Session Paused

3:02:22 PM Session Resumed

3:02:34 PM Chairman Chandler
Note: Sacre, Candace Redirect, for this witness?

3:02:42 PM Atty Vaysman Duke Kentucky - witness Sailers
Note: Sacre, Candace Redirect Examination. Will bills change at all if Net Metering 2 is approved as proposed?

3:03:14 PM Chairman Chandler - witness Sailers
Note: Sacre, Candace Examination. Objection calling those customers legacy customers?

3:03:36 PM Chairman Chandler - witness Sailers
Note: Sacre, Candace Unaware any objection letters ACY in Duke billing system?

3:03:48 PM Chairman Chandler
Note: Sacre, Candace Anything else?

3:03:53 PM Chairman Chandler
Note: Sacre, Candace Next witness?

3:03:58 PM Atty Vaysman Duke Kentucky
Note: Sacre, Candace Melissa Adams.

3:04:17 PM Chairman Chandler
Note: Sacre, Candace Witness is sworn.

3:04:25 PM Chairman Chandler - witness Adams
Note: Sacre, Candace Examination. Name and address?

3:04:35 PM Atty Vaysman Duke Kentucky - witness Adams
Note: Sacre, Candace Direct Examination. Cause responses be filed?

3:04:42 PM Atty Vaysman Duke Kentucky - witness Adams
Note: Sacre, Candace Corrections or changes?

3:04:47 PM Atty Vaysman Duke Kentucky - witness Adams
Note: Sacre, Candace Asked same questions, responses be same?

3:04:53 PM Atty Vaysman Duke Kentucky - witness Adams
Note: Sacre, Candace Intent responses be admitted?

3:05:12 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Cross Examination. Not cause direct or rebuttal filed?

3:05:41 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Involvement limited answering data requests?

3:05:48 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Have those before you?

3:05:54 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Correct following responded to, reading (click on link for further comments)?

3:06:30 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Explain what job description entails?

3:07:03 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Preparing work papers or overseeing the team?

3:07:10 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Involvement with DSM programs?

3:07:39 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Questions answered, second set, recall questions?

3:08:02 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Provided work papers used to calculate DSM avoided costs?

3:08:12 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Prepared work papers, any involvement?

3:08:52 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Who are members of your team that prepares work papers?

3:09:23 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Transmission and distribution avoided costs as factors, prepare those work papers?

3:09:41 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Name member of team that did?

3:10:04 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Aware of programs from Duke other service areas?

3:10:20 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace For example, Duke Carolina Improve and Save program?

3:10:26 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Also EnergyWise Home program?

3:10:31 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace And Duke Carolina Duke Energy Progress and PowerPair pilot program?

3:10:36 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Duke explored implementing programs similar in Kentucky?

3:11:43 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Involved in determination what DSM programs considered cost effective, include expenses for avoided costs?

3:12:02 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace In determining avoided costs, cost effectiveness assume certain degree of adoption of DSM measures across ratepayer class?

3:12:22 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace DEK evaluation include distribution costs avoided by DSM measures?

3:12:30 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Explain how adoption of DSM measures creates avoided distribution costs?

3:13:14 PM Atty Ernstberger Joint Intervenor - witness Adams
Note: Sacre, Candace Fair to say benefits accrue to system and other customers?

3:13:26 PM	Atty Ernstberger Joint Intervenor - witness Adams Note: Sacre, Candace	Fair to say avoided costs realized because customer needs less energy?
3:13:53 PM	Atty Ernstberger Joint Intervenor - witness Adams Note: Sacre, Candace	Does Duke evaluation of cost effectiveness of DSM include transmission costs?
3:14:03 PM	Atty Ernstberger Joint Intervenor - witness Adams Note: Sacre, Candace	Explain how individual adoption of DSM creates avoided transmission costs?
3:14:30 PM	Atty Ernstberger Joint Intervenor - witness Adams Note: Sacre, Candace	Fair to say benefits would accrue to system and other customers?
3:14:41 PM	Atty Ernstberger Joint Intervenor - witness Adams Note: Sacre, Candace	Also fair to say avoided transmission costs arise because less electricity to that customer?
3:14:54 PM	Atty Ernstberger Joint Intervenor - witness Adams Note: Sacre, Candace	Does Duke have ability monitor degree customer uses DSM?
3:15:17 PM	Atty Ernstberger Joint Intervenor - witness Adams Note: Sacre, Candace	Is the case for all DSM measures?
3:15:24 PM	Atty Ernstberger Joint Intervenor - witness Adams Note: Sacre, Candace	Fair to say use of these measures not constant or continuous?
3:16:23 PM	Atty Ernstberger Joint Intervenor - witness Adams Note: Sacre, Candace	Fair to say some DSM measures not constant or continuous?
3:16:31 PM	Atty Ernstberger Joint Intervenor - witness Adams Note: Sacre, Candace	Control timing, frequency, or pattern of usage by customers of DSM measures?
3:17:04 PM	Chairman Chandler Note: Sacre, Candace	Staff?
3:17:08 PM	Chairman Chandler Note: Sacre, Candace	Redirect?
3:17:14 PM	Chairman Chandler Note: Sacre, Candace	Procedural discussion. (Click on link for further comments.)
3:17:50 PM	Chairman Chandler Note: Sacre, Candace	Next witness?
3:17:52 PM	Atty Honaker Duke Kentucky Note: Sacre, Candace	Jacob Colley.
3:18:11 PM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
3:18:19 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Examination. Name and address?
3:18:32 PM	Atty Honaker Duke Kentucky - witness Colley Note: Sacre, Candace	Direct Examination. Title?
3:18:38 PM	Atty Honaker Duke Kentucky - witness Colley Note: Sacre, Candace	Cause responses be filed?
3:18:43 PM	Atty Honaker Duke Kentucky - witness Colley Note: Sacre, Candace	Additions or corrections?
3:18:46 PM	Atty Honaker Duke Kentucky - witness Colley Note: Sacre, Candace	If ask those questions today, answers be same?
3:18:50 PM	Atty Honaker Duke Kentucky - witness Colley Note: Sacre, Candace	Intent corporate those into record?
3:18:55 PM	Chairman Chandler Note: Sacre, Candace	Mr. West?
3:18:58 PM	Chairman Chandler Note: Sacre, Candace	Mr. Spenard?

3:19:02 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Cross Examination. Supplied information concerning successive customers, your experience homeowner sells home, person A, and then person B, billing begins with Person B?
3:21:23 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Residential customer contacts Duke, establishes move-in date, Data Request 2, Item 3, question about whether individual starting service, one-stop shopping, reads in part (click on link for further comments), sign up and become Duke customers, net metering customers have to do extra?
3:23:11 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	With regard to requirement, Response Second Request, Item 3, confirm Duke require customer NM1 submit application for interconnection and net metering, how is that simplified?
3:26:09 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Residential customer add solar file application for interconnection?
3:26:31 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Successive customer has solar installed when purchase for which been approval of application, using same form for continuation of net metering service?
3:27:05 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Response to First Request, Item 9, for Part B, reading (click on link for further comments), response states, reading (click on link for further comments), recall being in ballpark?
3:28:02 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	For successive customer take net metering have to file same application that all customers seeking commence service have to file, anticipation of number of days from application to approval to be given, projections on how many days take?
3:29:29 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Been here during prior testimony?
3:29:36 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Grandfathered customers getting one-to-one kilowatt credit?
3:29:44 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Customer moves in commences service and approved as Duke customer on April 1, half amount of time, April 31 still not approved net metering but receiving bill, as RS customer without net metering, benefit from one-to-one rate?
3:32:01 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Become Duke customer for residential service, period of time before interconnection application approved, billed like any other residential customer?
3:33:04 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	With regard to change in rated capacity of unit, change would knock individual out of NM1 legacy status?
3:33:40 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	If change increase or change is decrease, any change in inverter nameplate?
3:34:23 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Predictability, any value in Duke having a process who has solar facility and make modification any process contact Duke and get preapproval of change?
3:36:52 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Contact renewable service center, issue some type of documentation generated from center provide with feedback on what proposing?

3:39:32 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Other than increasing rated capacity of inverter, what other things a solar customer do knock out of legacy provisions for NM1 tariff?
3:40:45 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	Tampering with meter, case anybody tampers with meter have a problem?
3:41:10 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	With regard to policy, believe those legacy rights have value to individuals who receive service at that residence?
3:41:45 PM	Atty Spenard KYSEIA - witness Colley Note: Sacre, Candace	If customer has net metering facility getting one-to-one credit, more valuable than service under NMS2 tariff?
3:43:02 PM	Chairman Chandler Note: Sacre, Candace	Questions?
3:43:13 PM	Asst Gen Counsel Tussey PSC - witness Colley Note: Sacre, Candace	Cross Examination. Review public comments filed in this matter?
3:43:27 PM	Asst Gen Counsel Tussey PSC - witness Colley Note: Sacre, Candace	Sure were aware in Fifth Request asked for current customers and customers in queue?
3:44:00 PM	Asst Gen Counsel Tussey PSC - witness Colley Note: Sacre, Candace	Appears was one customer who is a current customer, aware of that, who filed public comment?
3:44:23 PM	Asst Gen Counsel Tussey PSC - witness Colley Note: Sacre, Candace	If ask in post-hearing if reached out to this gentleman, be able to respond to that?
3:44:24 PM	POST-HEARING DATA REQUEST Note: Sacre, Candace	ASST GEN COUNSEL TUSSEY PSC - WITNESS COLLEY
	Note: Sacre, Candace	RESPONSE TO GENTLEMAN WHO FILED PUBLIC COMMENT
3:44:44 PM	Asst Gen Counsel Tussey PSC - witness Colley Note: Sacre, Candace	Staff Fourth, Item 5, projects queued up as well, process began 2019?
3:45:09 PM	Asst Gen Counsel Tussey PSC - witness Colley Note: Sacre, Candace	A few others 2021 and 2022?
3:45:18 PM	Asst Gen Counsel Tussey PSC - witness Colley Note: Sacre, Candace	Confirm if Commission issued order people in queue have to take service under NM2 rider?
3:45:44 PM	Asst Gen Counsel Tussey PSC - witness Colley Note: Sacre, Candace	Same data request, Item 7, said possible Duke determine total kilowatts delivered from customer to meter and meter to customer?
3:46:20 PM	Asst Gen Counsel Tussey PSC - witness Colley Note: Sacre, Candace	Given that, explain why Duke Kentucky proposing not allow NM2 customers to participate advanced meter opt-out tariff?
3:48:16 PM	Chairman Chandler Note: Sacre, Candace	Vice Chair?
3:48:21 PM	Vice Chairman Hatton - witness Colley Note: Sacre, Candace	Examination. Monthly bills, public comments like bill, how change, how look differently?
3:50:21 PM	Vice Chairman Hatton - witness Colley Note: Sacre, Candace	Fear confusing information, not easy to understand, dollars instead of kilowatt hours or not know yet?
3:50:45 PM	Vice Chairman Hatton - witness Colley Note: Sacre, Candace	Like in a post-hearing data request?
3:51:19 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Examination. Provided a sample bill what look like?

3:51:25 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Know what current bill looks like?
3:51:31 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Say dual customer, current usage, last month's usage, net amount, below that monthly service charge, usage times amount, (click on link for further comments), know how net metering successor rate displayed on bill?
3:53:13 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Familiar with Rider AMO?
3:53:24 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	AMO available to residential customer that does not use radio-use, meters to be read manually, reading (click on link for further comments), sound about right?
3:54:18 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Earlier response availability of net metering, without ability of advanced meter to transmit information through radio frequency communication, not be able see anything but current meter reading?
3:56:12 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Saying not get information out of meter and not violate AMO or saying have to do something new and novel for billing?
3:57:03 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Make sure distinction inability of meter or mechanism or technology used to read meters or billing systems ability to take RF communication, where in that process is the issue?
3:58:16 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Not clear whether take additional IT or effort or physically impossible, way done today is not able, post-hearing data request what changes necessary allow customer taking service under NM1 or NM2?
3:58:17 PM	POST-HEARING DATA REQUEST Note: Sacre, Candace Note: Sacre, Candace	CHAIRMAN CHANDLER - WITNESS COLLEY CHANGES NECESSARY TO ALLOW CUSTOMER TAKING SERVICE UNDER RIDER AMO ABLE TO PARTICIPATE UNDER NM1 OR NM2
3:59:39 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Ask for update to Staff DR 4-5, 25 to 30 remaining applications in pending status, think that list shorter or about the neighborhood?
4:00:17 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Of project IDs listed there, backlog cleared?
4:00:29 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Average between getting application and in service less than 60 days?
4:00:43 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Assume know what calculation made up of, include outstanding or is that opened and closed average length of time?
4:01:06 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Showed up Jan 5 2023 still not connected, not show up as extra 500 days?
4:01:49 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	As opposed to want to get approval before spend money?
4:02:07 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Filed application on Dec 11, are 20 filed prior to Dec 11, excluding ones go back few years, description encompass a lot of that process?
4:03:32 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Conducted our part, said go ahead, waiting to get call back?

4:04:00 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Pending install confirmation, just waiting to get call back to do confirmation?
4:04:38 PM	Chairman Chandler - witness Colley Note: Sacre, Candace	Is way to tell us we are the holdup in getting people in service, enter final order which got in, those did not waiting on them, we haven't done our part?
4:05:26 PM	Chairman Chandler Note: Sacre, Candace	Redirect?
4:05:28 PM	Atty Honaker Duke Kentucky - witness Colley Note: Sacre, Candace	Redirect Examination. Recall questions about public comments and bills and how will change?
4:05:35 PM	Atty Honaker Duke Kentucky - witness Colley Note: Sacre, Candace	If comments from legacy net metering customer, bills change?
4:05:55 PM	Atty Honaker Duke Kentucky - witness Colley Note: Sacre, Candace	Existing customers still compensated same way grandfathered under existing tariff?
4:06:27 PM	Session Paused	
4:23:04 PM	Session Resumed	
4:23:30 PM	Chairman Chandler Note: Sacre, Candace	Back on the record.
4:23:33 PM	Chairman Chandler Note: Sacre, Candace	Call next witness?
4:23:35 PM	Atty Vaysman Duke Kentucky Note: Sacre, Candace	Call Matthew Kalemba.
4:23:44 PM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
4:23:51 PM	Chairman Chandler - witness Kalemba Note: Sacre, Candace	Examination. Name and address?
4:23:58 PM	Atty Vaysman Duke Kentucky - witness Kalemba Note: Sacre, Candace	Cross Examination. Title?
4:24:06 PM	Atty Vaysman Duke Kentucky - witness Kalemba Note: Sacre, Candace	Cause testimony be filed?
4:24:14 PM	Atty Vaysman Duke Kentucky - witness Kalemba Note: Sacre, Candace	Corrections or changes?
4:24:40 PM	Atty Vaysman Duke Kentucky - witness Kalemba Note: Sacre, Candace	Asked same questions, responses same?
4:24:50 PM	Atty Vaysman Duke Kentucky - witness Kalemba Note: Sacre, Candace	Intent be admitted into record?
4:25:02 PM	Chairman Chandler Note: Sacre, Candace	Questions?
4:25:22 PM	Atty Gary Joint Intervenors - witness Kalemba Note: Sacre, Candace	Cross Examination. Title changed, has role changed?
4:26:02 PM	Atty Gary Joint Intervenors - witness Kalemba Note: Sacre, Candace	Part of team before, supervisor's role?
4:26:10 PM	Atty Gary Joint Intervenors - witness Kalemba Note: Sacre, Candace	Primary role, inputs?
4:26:22 PM	Atty Gary Joint Intervenors - witness Kalemba Note: Sacre, Candace	Particularly with avoided costs?
4:26:44 PM	Atty Gary Joint Intervenors - witness Kalemba Note: Sacre, Candace	Principles, transparent data should be used?
4:26:55 PM	Atty Gary Joint Intervenors - witness Kalemba Note: Sacre, Candace	Commission expressed use of net cone utilities in PJM area?

4:27:04 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Not what proposed here?

4:27:12 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Updated inputs he used?

4:27:20 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace In rebuttal, mentions updated PJM ELCC fixed tilt solar?

4:27:31 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Table labeled JI-2?

4:27:45 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Where got updated ELCC figure?

4:27:50 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Top of that page reference to FERC order?

4:28:15 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Familiar with FERC order?

4:28:32 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Wouldn't have read order?

4:28:37 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Not aware of purpose of updated ELCCs?

4:29:11 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Aware FERC order and PJM application was to update methodology for all generation resources?

4:29:27 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Aware proposed assign marginal ELCCs all generation resources?

4:29:35 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Not case before?

4:29:40 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Was just these variable resources and limited duration resources?

4:30:00 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace PJM proposed to assign ELCCs to firm resources as well?

4:30:19 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Next step, calculate updated UCAP?

4:30:37 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Those based in part on new ELCCs?

4:30:45 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Develop an ICAP, ELCC used to develop UCAP?

4:31:00 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Looking at table, ELCCs dropped, Sailors rebuttal dropped for fixed tilt solar, ELCCs also dropped for other resources?

4:31:17 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Skipped a step, UCAP goes into calculating net cone figure or is net cone figure?

4:31:30 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace PJM not got to UCAP stuff yet, using new ELCCs?

4:31:40 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace ICAP has own net cone, divided by ELCC to get unforced capacity or UCAP?

4:32:29 PM Via Presentation Activated

4:32:32 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Placed in record or referenced in record, look familiar to you?

4:32:50 PM Atty Gary Joint Intervenor - witness Kalemba
Note: Sacre, Candace Generally, installed capacity on dollar-per-megawatt-day basis divided by ELCC and get unforced capacity number UCAP greater than ICAP?

4:33:08 PM Via Presentation Deactivated

4:33:24 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace And not gotten to UCAP step after FERC order, just used ELCCs?

4:33:33 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Used updated ELCCs and applied to peaker methodology?

4:33:43 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Describe how that developed?

4:34:33 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace LMPs not capacity portion?

4:34:41 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Specifically, capacity portion, asked about basis of peaker methodology, DSM filings?

4:35:03 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace His understanding based on 2016 reference unit updated since then from inflation?

4:35:23 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Generally, more expensive overall?

4:35:32 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Gone up in last year or two?

4:35:39 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Updated peaker method mentioned Sailer rebuttal account for updated ELCC for combustion turbines?

4:35:52 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace When peaker method updated, account for effects of new environmental regulations?

4:36:28 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Mentioned just capacity portion, environmental costs included in energy price?

4:36:41 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Broad categories?

4:36:50 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Required for compliance with EPA rules?

4:36:58 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Updated or added to periodically?

4:37:06 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Company updates projections of costs as far as IRP process in charge of?

4:37:10 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace For IRP, update every three years?

4:37:25 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Environmental costs accounted for in energy, cost of O&M, SOx and NOx allowances?

4:37:45 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Energy cost accounts for compliance costs O&M?

4:37:56 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Environmental compliance cost also come from installing equipment?

4:38:02 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Accounted for in energy costs, cost to install equipment?

4:38:21 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Reduction?

4:39:24 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Would cost install equipment on existing resource be accounted for in modeling continue running that or new resource?

4:39:50 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace So cost install equipment not necessarily accounted for in capacity cost, say, avoided capacity cost here for CT?

4:40:05 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Just cost have to go out and build new CT?

4:40:46 PM Chairman Chandler - witness Kalembo
Note: Sacre, Candace Examination. Under impression PJM energy markets allow generators include capital costs in energy bids?

4:41:26 PM Chairman Chandler - witness Kalembo
Note: Sacre, Candace Presuming that compliance markets to buy credits equal to capital abatement costs, could buy credits include in energy cost, show up in modeling?

4:41:55 PM Chairman Chandler - witness Kalembo
Note: Sacre, Candace But only cite two of those markets?

4:42:02 PM Chairman Chandler - witness Kalembo
Note: Sacre, Candace CCR compliance costs, ELG compliance costs, kind of environmental compliance cost include as risk or capital expense or upgrade risk in IRP, not have market buy credits?

4:42:47 PM Chairman Chandler - witness Kalembo
Note: Sacre, Candace As reduction of available supply that increases prices?

4:42:56 PM Chairman Chandler - witness Kalembo
Note: Sacre, Candace How else would that impact power prices?

4:43:30 PM Chairman Chandler - witness Kalembo
Note: Sacre, Candace Are you talking about consumables, environmental consumables?

4:44:12 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Cross Examination (cont'd). Mentioned allowance costs for SOx and NOx and allowances are consumed, need those to run an SCR?

4:44:32 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Those allowance costs came from third party before calculating your portion?

4:44:44 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Response said those for compliance with Good Neighbor?

4:44:52 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Joint Intervenor First, Question 4-C, reading (click on link for further comments)?

4:45:20 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Impacts of Good Neighbor Plan reflected in NOX/SO2 allowance prices input in Encompass model?

4:45:32 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Familiar with Good Neighbor Plan?

4:45:42 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Aware of basis for Good Neighbor Plan?

4:45:47 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Required for compliance with the 2015 ozone national ambient air quality standard, interstate transport of pollutants under 2015?

4:45:59 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace A lot of rules for NAAQS compliance generally?

4:46:06 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Interstate transport prior to Good Neighbor, cross-state air pollution rule or CASPER and CASPER update and revised update, multiple iterations?

4:46:30 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Aware of current status of Good Neighbor Plan?

4:46:37 PM Atty Gary Joint Intervenors - witness Kalembo
Note: Sacre, Candace Aware been some back and forth?

4:46:44 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Varies from state to state?

4:46:50 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Allowance costs, for PJM market as a whole?

4:47:12 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Aware whether costs Group 3 program or Group 2 program?

4:47:25 PM Atty Gary Joint Intervenors
Note: Sacre, Candace Ask for in a post-hearing data request, what allowance costs are based on.

4:47:26 PM POST-HEARING DATA REQUEST
Note: Sacre, Candace ATTY GARY JOINT INTERVENORS - WITNESS KALEMBA
Note: Sacre, Candace ON WHAT ARE ALLOWANCE COSTS BASED

4:47:50 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Cross Examination (cont'd). Back to energy prices, said LMPs reflect price energy PJM market?

4:48:00 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Describe area PJM market geographically?

4:48:18 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Up east coast?

4:48:25 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Testimony filed in December last year?

4:48:28 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Said model models entire eastern interconnects, so LMPs reflective of entire eastern?

4:48:54 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace LMPs reflect PJM market within eastern interconnect?

4:49:05 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Testimony filed December last year, aware EPA adopted new fine particulate matter since then, National Ambient Air Quality Standard?

4:49:20 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Aware process after develop new NAAQS for implementing?

4:49:29 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace After each NAAQS, EPA designate area attainment or nonattainment?

4:49:36 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Generally more requirements to build and operate in nonattainment area?

4:49:45 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Nonattainment resource review includes lowest achievable emissions and offsets new resources?

4:49:55 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace More regulations make more expensive build new resource?

4:50:02 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Aware much of PJM area nonattainment for one NAAQS?

4:50:11 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Surprise you much of east coast has environmental problems generally?

4:50:17 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Lower NAAQS result more areas nonattainment?

4:50:24 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Means harder build new resources?

4:50:33 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Which means more expensive?

4:50:47 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Accounted for environmental costs in energy prices?

4:51:13 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Cost to build new resources becomes more expensive?

4:51:28 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Aware other regulations adopted by EPA since December?

4:51:34 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Aware Interior Department announced not make further coal leases in Powder River Basin?

4:51:55 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Less coal leasing tend drive energy prices up or down?

4:52:07 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace EPA announced number of new rules, generally aware of that?

4:52:20 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Mercury and air toxics rule?

4:52:25 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace ELG already mentioned but updated effluent limitation guidelines?

4:52:31 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Greenhouse gas rule?

4:52:38 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Back to JI 1-4 C, at time asked, generally said company not include compliance with future regulations in avoided costs?

4:53:04 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Cost to comply not accounted for?

4:53:16 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Not in updated costs in Sailors rebuttal?

4:53:24 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Were not in original, not in updated either?

4:53:30 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Regard to avoided carbon cost, your testimony fully accounted for embedded in proposal related to IRA?

4:53:47 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Similar impacts what carbon tax might have had?

4:53:53 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace And used inverse approach in IRP?

4:54:34 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Carbon tax is proxy for costs for carbon emissions?

4:54:43 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Not that we expect Kentucky adopt carbon tax soon?

4:55:00 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Mentioned GHG rule, had chance to review costs with that at all?

4:55:11 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace EPA estimated costs of compliance with GHG rule?

4:55:25 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Haven't had chance to read rule in full?

4:55:40 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Read rule and read estimates?

4:55:50 PM Atty Gary Joint Intervenors
Note: Sacre, Candace Probably refer to in briefing, would ask Commission take administrative notice. (Click on link for further comments.)

4:56:33 PM Atty Gary Joint Intervenors - witness Kalemba
Note: Sacre, Candace Cross Examination (cont'd). Now oversee IRP process but involved in prior IRP filing?

4:56:57 PM Chairman Chandler
Note: Sacre, Candace Counsel?

4:57:00 PM Asst Gen Counsel Tussey PSC - witness Kalemba
Note: Sacre, Candace Cross Examination. Top of page 5, direct, stated, reading (click on link for further comments), familiar with principles that Gary asked Sailors about 2020-00174 case?

4:57:48 PM Asst Gen Counsel Tussey PSC - witness Kalemba
Note: Sacre, Candace With regard to database, considered confidential?

4:58:12 PM Asst Gen Counsel Tussey PSC - witness Kalemba
Note: Sacre, Candace Any modeling that comes out of that, any of those results compared to or evaluated against modeling that uses publicly available data?

4:59:35 PM Asst Gen Counsel Tussey PSC - witness Kalemba
Note: Sacre, Candace Any way for someone not work at Duke Kentucky verify or analyze results of modeling?

4:59:56 PM Asst Gen Counsel Tussey PSC - witness Kalemba
Note: Sacre, Candace But not data used?

5:00:05 PM Asst Gen Counsel Tussey PSC - witness Kalemba
Note: Sacre, Candace LMPs, agree LMPs change on portfolio developed?

5:00:35 PM Asst Gen Counsel Tussey PSC - witness Kalemba
Note: Sacre, Candace Bottom of page 5, direct, talk about carbon costs and carbon tax, not include tax in development of IRPs same outcome, describe what mean by same outcome?

5:02:30 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Examination. Worked on Duke Energy Kentucky 2021 IRP?

5:02:47 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Familiar with IRP and how treated carbon emission regulation?

5:03:10 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace If I said on page 142 of 174, it said, reading (click on link for further comments), sound familiar how Duke looks at risks in other IRPs?

5:04:01 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Reasonable way to model assume what think likely happen, stay on line and look at incremental environmental costs as expense?

5:04:29 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace When generation choices are not hardcoded into IRP models, whether retires a generator and adds different one?

5:04:46 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Whether stay open costs more or less than alternative generation?

5:05:03 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Real important input generation decisions and integrated resource planning?

5:05:38 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Are risks symmetrical, not including require engage in future underestimating expenses, assuming incur them and unrealistic, more expensive for consumers?

5:06:56 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Agree in Duke Kentucky 2021 IRP assumed over 15-year period different environmental costs than just NOx and SOx emission credits?

5:07:28 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Agree additional capital risks included in IRP same risks that Commission required be calculated in Kentucky Power net metering successor case representative of avoided environmental compliance costs?

5:07:54 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Know from IRP context, if Commission said, reading (click on link for further comments), that kind of environmental costs similar what you do in IRP?

5:09:11 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Carbon, model impact of IRA?

5:09:23 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Include that in 25-year energy presumption what happens with new entry generation?

5:09:46 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Watch hearing in 2021 Integrated Resource Plan?

5:09:56 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Know who Vicky Sullivan is?

5:10:07 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Based on experience with Sullivan, say be well placed have appreciation likelihood carbon regulation or carbon tax?

5:10:31 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Have experience with Sullivan as taking counsel how to treat risk of carbon regulation in integrated resource plans?

5:10:50 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Testified in that case remember watching hearing and Sullivan testifying?

5:10:57 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Surprise to know she testified on likelihood of CO2 regulation?

5:11:02 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace CO2 regulation was specific item included as risk 2021 IRP?

5:11:11 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Surprise you if 2021 IRP said, reading (click on link for further comments)?

5:11:38 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Position if do believe carbon constraining world, no longer appropriate model as carbon tax but model IRA and amendments to investment and production tax credits?

5:12:22 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Constraint be cost of abatement with regard to generating fleet?

5:12:30 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Know emissions profile of current generating fleet, gas and coal?

5:12:40 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Know what CO2 is megawatt hour basis?

5:12:45 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Have idea what cost of abatement be with regards to CO2?

5:12:55 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Either reduction in output, carbon capture sequestration be, or capital and incremental operating cost of coal firing, is that neighborhood include as expenses?

5:13:20 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Know all those costs, have proxy for those expenses?

5:13:32 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Come up with dollar kW?

5:13:36 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Know what emissions are?

5:13:46 PM Chairman Chandler - witness Kalemba
Note: Sacre, Candace Come up with equivalent cost of abatement for those facilities?

5:14:34 PM	Chairman Chandler - witness Kalembo Note: Sacre, Candace	Could, but at some point, doing IRPs Kentucky vertically integrated state?
5:14:41 PM	Chairman Chandler - witness Kalembo Note: Sacre, Candace	Vertically integrated states have expectation generators have enough generation serve retail customers?
5:14:56 PM	Chairman Chandler - witness Kalembo Note: Sacre, Candace	Can't just assume customers going to buy whatever market is and generators are going to build and utility indifferent?
5:15:22 PM	Chairman Chandler - witness Kalembo Note: Sacre, Candace	When comes to carbon risk or environmental compliance risk, at what point are you looking at avoiding future incremental capital costs?
5:16:25 PM	Chairman Chandler - witness Kalembo Note: Sacre, Candace	If that is retirement and replacement every kW demand reduce, smaller replacement generator utility need?
5:16:41 PM	Chairman Chandler - witness Kalembo Note: Sacre, Candace	Reduce demand, not replace retiring generation with same size, generation capacity cost avoiding, that's the calculation what trying to ask?
5:17:19 PM	Chairman Chandler - witness Kalembo Note: Sacre, Candace	As relates to retail and native load, about capacity?
5:17:34 PM	Chairman Chandler - witness Kalembo Note: Sacre, Candace	As relates to proposed environmental credit has nothing to do with capacity?
5:17:59 PM	Chairman Chandler Note: Sacre, Candace	Redirect?
5:18:09 PM	Chairman Chandler Note: Sacre, Candace	Next witness?
5:18:12 PM	Atty Honaker Duke Kentucky Note: Sacre, Candace	Timothy Hohenstatt.
5:18:28 PM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
5:18:33 PM	Chairman Chandler - witness Hohenstatt Note: Sacre, Candace	Examination. Name and address?
5:18:44 PM	Atty Honaker Duke Kentucky - witness Hohenstatt Note: Sacre, Candace	Direct Examination. Title?
5:18:50 PM	Atty Honaker Duke Kentucky - witness Hohenstatt Note: Sacre, Candace	Cause responses be filed?
5:18:56 PM	Atty Honaker Duke Kentucky - witness Hohenstatt Note: Sacre, Candace	Additions or corrections?
5:19:00 PM	Atty Honaker Duke Kentucky - witness Hohenstatt Note: Sacre, Candace	If ask same questions, responses be same?
5:19:04 PM	Atty Honaker Duke Kentucky - witness Hohenstatt Note: Sacre, Candace	Intent incorporate into record?
5:19:10 PM	Chairman Chandler Note: Sacre, Candace	Questions?
5:19:30 PM	Chairman Chandler Note: Sacre, Candace	Procedural discussion. (Click on link for further comments.)
5:19:57 PM	Chairman Chandler Note: Sacre, Candace	Next witness?
5:20:00 PM	Atty Honaker Duke Kentucky Note: Sacre, Candace	Nick Melillo.

5:20:06 PM Chairman Chandler
Note: Sacre, Candace Witness is sworn.

5:20:13 PM Chairman Chandler - witness Melillo
Note: Sacre, Candace Examination. Name and address?

5:20:23 PM Atty Honaker Duke Kentucky - witness Melillo
Note: Sacre, Candace Direct Examination. Title?

5:20:27 PM Atty Honaker Duke Kentucky - witness Melillo
Note: Sacre, Candace Cause certain responses be filed?

5:20:32 PM Atty Honaker Duke Kentucky - witness Melillo
Note: Sacre, Candace Additions or corrections?

5:20:36 PM Atty Honaker Duke Kentucky - witness Melillo
Note: Sacre, Candace If ask same questions, responses be same?

5:20:41 PM Atty Honaker Duke Kentucky - witness Melillo
Note: Sacre, Candace Intent to incorporate into record?

5:20:45 PM Chairman Chandler
Note: Sacre, Candace Recess.

5:21:27 PM Session Paused

5:29:46 PM Session Resumed

5:30:11 PM Session Paused

5:30:30 PM Session Resumed

5:30:55 PM Chairman Chandler
Note: Sacre, Candace Mr. Spenard?

5:31:06 PM Atty Spenard KYSEIA - witness Melillo
Note: Sacre, Candace Cross Examination. Are witness who sponsored responses Parts B and C, response to KYSEIA 2-13, familiar?

5:31:33 PM Atty Spenard KYSEIA - witness Melillo
Note: Sacre, Candace Here during testimony of Sailers?

5:31:38 PM Atty Spenard KYSEIA - witness Melillo
Note: Sacre, Candace Part B of response, question was, reading (click on link for further comments), response begins, reading (click on link for further comments), see that?

5:32:22 PM Atty Spenard KYSEIA - witness Melillo
Note: Sacre, Candace Say power generally takes path of least resistance, explain what that means?

5:32:58 PM Atty Spenard KYSEIA - witness Melillo
Note: Sacre, Candace In terms of residential customer solar generator on home, when customer net exporting, what happens to that power?

5:34:12 PM Chairman Chandler
Note: Sacre, Candace Mr. Gary?

5:34:18 PM Atty Gary Joint Intervenors - witness Melillo
Note: Sacre, Candace Cross Examination. Not go to neighbor necessarily, nearest person in need of power at that moment?

5:34:47 PM Atty Gary Joint Intervenors - witness Melillo
Note: Sacre, Candace Go to closest place where needed?

5:34:56 PM Chairman Chandler - witness Melillo
Note: Sacre, Candace Examination. Just explained idea behind sources and sinks, in practice?

5:35:03 PM Chairman Chandler - witness Melillo
Note: Sacre, Candace Not go to neighbor if neighbor exporting?

5:35:08 PM Chairman Chandler - witness Melillo
Note: Sacre, Candace Path of least resistance necessarily, phrase thrown around, it's all paths and prefers least resistance?

5:35:30 PM Chairman Chandler - witness Melillo
Note: Sacre, Candace Big picture of your job?

5:36:11 PM	Chairman Chandler - witness Melillo Note: Sacre, Candace	When say capacity planning, talking about transmission or generation?
5:36:14 PM	Chairman Chandler - witness Melillo Note: Sacre, Candace	Distribution capacity planning, envision a future system operator, would assume your job make sure not build system based off expectation, minimizing size of system to what works?
5:37:35 PM	Chairman Chandler - witness Melillo Note: Sacre, Candace	To meet demand incur, not what consumer might be using, looking at total usage or net of or without regards what production might be or what actual demand is?
5:38:23 PM	Chairman Chandler - witness Melillo Note: Sacre, Candace	That is possible because not have penetration in excess of one percent in midwest?
5:38:38 PM	Chairman Chandler - witness Melillo Note: Sacre, Candace	In areas where seem to have penetration of distribution system, can afford ignore all DERs?
5:39:04 PM	Chairman Chandler - witness Melillo Note: Sacre, Candace	Talk to colleagues in Florida, what they do?
5:39:16 PM	Chairman Chandler - witness Melillo Note: Sacre, Candace	Not have conversations if get these electric vehicles, tariffs, incent them to reduce demand, so not have to overbuild system to detriment of consumers?
5:39:51 PM	Chairman Chandler - witness Melillo Note: Sacre, Candace	Field of dreams issue, wait for everything to come, be reactive, what would be your recommendation?
5:40:05 PM	Chairman Chandler - witness Melillo Note: Sacre, Candace	Have found have to be reactionary ends up more costly, being reactionary as opposed balancing being proactive and reactive?
5:40:25 PM	Chairman Chandler - witness Melillo Note: Sacre, Candace	When utility has cost of service regulation, more expensive means more expensive for system and customers?
5:40:34 PM	Chairman Chandler Note: Sacre, Candace	Counsel?
5:40:45 PM	Chairman Chandler Note: Sacre, Candace	Last witness?
5:40:48 PM	Atty Vaysman Duke Kentucky Note: Sacre, Candace	John Swez.
5:41:03 PM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.
5:41:08 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Examination. Name and address?
5:41:20 PM	Atty Vaysman Duke Kentucky - witness Swez Note: Sacre, Candace	Direct Examination. Title?
5:41:26 PM	Atty Vaysman Duke Kentucky - witness Swez Note: Sacre, Candace	Cause responses be filed?
5:41:33 PM	Atty Vaysman Duke Kentucky - witness Swez Note: Sacre, Candace	Adopting additional data responses?
5:41:41 PM	Atty Vaysman Duke Kentucky - witness Swez Note: Sacre, Candace	From Scott Burnside?
5:41:50 PM	Atty Vaysman Duke Kentucky - witness Swez Note: Sacre, Candace	Have corrections or changes?
5:41:57 PM	Atty Vaysman Duke Kentucky - witness Swez Note: Sacre, Candace	If asked same questions, responses be same?

5:42:03 PM Atty Vaysman Duke Kentucky - witness Swez
Note: Sacre, Candace Intend admitted into record?

5:42:13 PM Chairman Chandler
Note: Sacre, Candace Questions?

5:42:26 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Examination. Been here for whole hearing?

5:42:34 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Insofar as successor net metering customer consumes own electricity avoiding entirety of retail rate, remember that part?

5:43:06 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Make sense to you?

5:43:16 PM Chairman Chandler - witness Swez
Note: Sacre, Candace What's happening, avoiding having to buy from utility and benefit is avoided tariff rate, make sense to you?

5:43:46 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Effectively benefit Duke as a system receives behind wholesale meter generation?

5:45:11 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Registered?

5:45:22 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Location?

5:45:25 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Parallel trying to ask about, those behind the wholesale meter large generators not discounted by ELCC values for purposes of FRR plan?

5:46:02 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Not know into future what will provide but can look back in sense know production is?

5:47:03 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Benefit get reduces load coincident snapshot PJM taking to determine future demand requirements?

5:47:27 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Then gets grossed up, one less megawatt need, agree?

5:48:21 PM Chairman Chandler - witness Swez
Note: Sacre, Candace If increase demand by one megawatt, have to carry more than one megawatt generation?

5:48:37 PM Chairman Chandler - witness Swez
Note: Sacre, Candace If PJM tells you sorry one megawatt more, have to go find or add one megawatt plus reserve margin?

5:49:01 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Opposite be true, 900 megawatts demand, only need 998, the other way is true?

5:49:39 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Another meter back, Walton producing middle of summer, producing near nameplate, bunch of customers generating excess electricity, how does that translate that layer and wholesale meter in terms of FRR plan?

5:51:10 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Summer what planning for, riskiest hours, saving that level of generation plus reserve margin?

5:52:02 PM Chairman Chandler - witness Swez
Note: Sacre, Candace EUE?

5:52:14 PM Chairman Chandler - witness Swez
Note: Sacre, Candace Talking about excess unserved energy?

5:52:24 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Loss of load probability, loss of hours, and EUE magnitude that go unserved because of loss of load?
5:52:41 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Looking at all as risks?
5:52:47 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	And in terms of what you do with FRR plan, anybody bring up customer cited DERs, rooftop solar, integration electric vehicles, how integrated in meeting least cost most reasonable planning criteria?
5:54:22 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Insofar as utility cost effectively reduce that single number PJM gives you, system benefit all consumers?
5:55:04 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	DR totally separate because resource?
5:55:15 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Thermal generators, demand response, then just load, how looking at things FRR level?
5:55:49 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Insofar as cost effectively reduce load number, require less DR or less thermal resources, saving what would have had to pay, or not have to use them to satisfy entirety of plan and monetize in some way?
5:56:40 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Do you tell people that load reduction is benefit, have conversation what that breakeven is, know to look for something cost effective?
5:57:30 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	How do customer programs find out about what target, how do they know what costs in terms of meeting that plan?
5:58:16 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Remember when Commission attempted to get rid Duke DSM programs?
5:58:24 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Remember speed by which Duke asked reconsider its decision?
5:58:33 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Without DSM programs, not able meet FRR plan?
5:59:25 PM	Chairman Chandler - witness Swez Note: Sacre, Candace	Real important loop there, one plays into the other?
5:59:33 PM	Chairman Chandler Note: Sacre, Candace	Anything else?
5:59:40 PM	Chairman Chandler Note: Sacre, Candace	Not have additional questions JI-1? (Click on link for further comments.)
5:59:41 PM	JOINT INTERVENORS HEARING EXHIBIT 1 Note: Sacre, Candace Note: Sacre, Candace	ATTY GARY JOINT INTEVENORS - WITNESS SAILERS ELCC CLASS RATINGS FOR THE 2025/2026 BASE RESIDUAL AUCTION
6:00:33 PM	Chairman Chandler Note: Sacre, Candace	Anything else from company?
6:00:43 PM	Chairman Chandler Note: Sacre, Candace	Call your witness?
6:01:13 PM	Atty Gary Joint Intervenors Note: Sacre, Candace	Richard McCann.
6:01:18 PM	Chairman Chandler Note: Sacre, Candace	Witness is sworn.

6:01:24 PM	Chairman Chandler - witness McCann Note: Sacre, Candace	Examination. Name and address?
6:01:41 PM	Atty Gary Joint Intervenors - witness McCann Note: Sacre, Candace	Direct Examination. Cause testimony be filed?
6:01:46 PM	Atty Gary Joint Intervenors - witness McCann Note: Sacre, Candace	And responses to data requests?
6:01:53 PM	Atty Gary Joint Intervenors - witness McCann Note: Sacre, Candace	If ask same questions, answers be same?
6:02:04 PM	Atty Gary Joint Intervenors - witness McCann Note: Sacre, Candace	Any corrections to testimony or responses?
6:02:51 PM	Atty Gary Joint Intervenors - witness McCann Note: Sacre, Candace	The note you mentioned?
6:03:27 PM	Atty Gary Joint Intervenors - witness McCann Note: Sacre, Candace	State what documents or materials have with you today?
6:04:10 PM	Chairman Chandler Note: Sacre, Candace	Ask you file those in markup with errata. (Click on link for further comments.)
6:04:32 PM	Chairman Chandler Note: Sacre, Candace	Questions?
6:04:45 PM	Atty Vaysman Duke Kentucky - witness McCann Note: Sacre, Candace	Cross Examination. Familiar with Kentucky net metering statutes?
6:05:05 PM	Atty Vaysman Duke Kentucky - witness McCann Note: Sacre, Candace	Surprise you in definition of eligible customer generator statute specifies customer generation be "primary purpose supplying all or part own requirements?"
6:05:28 PM	Atty Vaysman Duke Kentucky - witness McCann Note: Sacre, Candace	Aware of similar requirements for utility scale solar?
6:05:40 PM	Atty Vaysman Duke Kentucky - witness McCann Note: Sacre, Candace	When utility scale solar generating, always exporting?
6:06:04 PM	Atty Vaysman Duke Kentucky - witness McCann Note: Sacre, Candace	Net metering customer serving one Duke customer?
6:06:14 PM	Atty Vaysman Duke Kentucky - witness McCann Note: Sacre, Candace	When say serving one customer, him or herself?
6:06:45 PM	Atty Vaysman Duke Kentucky - witness McCann Note: Sacre, Candace	Single customer is the customer who has solar panels?
6:06:53 PM	Atty Vaysman Duke Kentucky - witness McCann Note: Sacre, Candace	Idea when net metering customer generating often not exporting?
6:07:16 PM	Chairman Chandler Note: Sacre, Candace	Questions?
6:08:02 PM	Chairman Chandler Note: Sacre, Candace	Anything else?
6:08:07 PM	Chairman Chandler Note: Sacre, Candace	Post-hearing data requests.
6:10:22 PM	Chairman Chandler Note: Sacre, Candace	Briefs.
6:12:45 PM	Chairman Chandler Note: Sacre, Candace	Anything else?
6:12:55 PM	Chairman Chandler Note: Sacre, Candace	Hearing adjourned.
6:13:48 PM	Session Ended	



Name:	Description:
JOINT INTERVENORS HEARING EXHIBIT 1	PJM ELCC CLASS RATINGS FOR THE 2025/2026 BASE RESIDUAL AUCTION
JOINT INTERVENORS HEARING EXHIBIT 2	LETTER DATED MARCH 25 2024 FROM AMY B. SPILLER TO HONORABLE DAVID OSBORNE RE: SB 349
KYSEIA HEARING EXHIBIT 1	CASE NO. 2023-00413 ATTACHMENT BLS-2 PAGE 111 OF 112 INPUTS FOR CALCULATIONS
KYSEIA HEARING EXHIBIT 10	CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 1 PAGES 81 AND 82 OF 205
KYSEIA HEARING EXHIBIT 11	CASE NO. 2023-00413 ATTACHMENT BLS-2 PAGE 28 OF 112 AND PAGE 1 OF 1
KYSEIA HEARING EXHIBIT 2	CASE NO. 2023-00413 KYSEIA-DR-02-011 ATTACHMENT PAGE 86 OF 116 MONTHLY STATISTICS RS RATE GROUP APR 2021 THROUGH MAR 2022
KYSEIA HEARING EXHIBIT 3	CASE NO. 2023-00413 ATTACHMENT BLS-2 PAGE 2 OF 112
KYSEIA HEARING EXHIBIT 4	CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 2 PAGE 177 OF 187
KYSEIA HEARING EXHIBIT 5	CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 1 PAGE 41 OF 205
KYSEIA HEARING EXHIBIT 6	NATIONAL RENEWABLE ENERGY LABORATORY PVWATTS VERSION 5 MANUAL
KYSEIA HEARING EXHIBIT 7	CASE NO. 2023-00413 KYSEIA-DR-02-009 ATTACHMENT 2 PAGE 1 OF 187
KYSEIA HEARING EXHIBIT 8	CASE NO. 2023-00413 KYSEIA-D-02-009 ATTACHMENT 2 PAGE 28 OF 187
KYSEIA HEARING EXHIBIT 9	CASE NO. 2023-00413 ATTACHMENT BLS-2 PAGE 1 OF 1



ELCC Class Ratings for the 2025/2026 Base Residual Auction

The following table provides the ELCC Class Ratings applicable to the 2025/2026 Base Residual Auction (BRA) as calculated under the methodology approved by FERC on January 30th, 2024 in Docket No. ER24-99.

	2025/2026 BRA ELCC Class Ratings
Onshore Wind	35%
Offshore Wind	60%
Fixed-Tilt Solar	9%
Tracking Solar	14%
Landfill Intermittent	54%
Hydro Intermittent	37%
4-hr Storage	59%
6-hr Storage	67%
8-hr Storage	68%
10-hr Storage	78%
Demand Resource	76%
Nuclear	95%
Coal	84%
Gas Combined Cycle	79%
Gas Combustion Turbine	62%
Gas Combustion Turbine Dual Fuel	79%
Diesel Utility	92%
Steam	75%

- Pursuant to RAA Schedule 9.2, sections C(2) and D(1)(b): No ELCC Class Rating is determined for Combination Resources and ELCC Resources in the Hydropower with Non-Pumped Storage Class, in the Complex Hybrid Class, in the Other Unlimited Resource Class, and in any ELCC Class whose members are so distinct from one another that a single ELCC Class Rating would fail to capture their physical characteristics. In these instances, the Accredited UCAP is based on a resource-specific ELCC analysis.
- For the 2025/2026 Delivery Year, PJM determined that the members of the Gas Combined Cycle Dual Fuel Class are so distinct from one another that a single ELCC Class Rating would fail to capture their physical characteristics. This is due to the Gas Combined Cycle Dual Fuel Class having very few members (less than 10 units) following the dual fuel attestation process for the 2025/26 BRA and there being a large disparity in the observed historical performance during hours of risk across the members of this class. Therefore, no ELCC Class Rating will be determined for the Gas Combined Cycle Dual Fuel Class for the 2025/2026 Delivery Year.



Amy B. Spiller
President
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March 25, 2024

The Honorable David Osborne, Speaker, and
Members of the Kentucky House of Representatives

RE: SB 349

Dear Honorable David Osborne, Speaker, and
Members of the Kentucky House of Representatives:

In my role as President of Duke Energy Ohio and Kentucky, I lead the talented men and women who work tirelessly – every day – to safely deliver reliable power to our customers in Northern Kentucky. For well over a century, we have provided energy for the business of Kentucky. But SB 349 will change how business is done in the Commonwealth; it will call into question whether new or existing businesses will want to grow in a state that has shown an annual willingness to jeopardize access to affordable, reliable power. This is why my company and so many other organizations, from regional and national business chambers to consumer advocates, are opposing SB 349 as written.

We have all seen the headlines – demand for power is rapidly increasing in parts of the country and there is reported concern of possible energy shortages in the future. Knowing that affordable, reliable energy is a catalyst for growth, opponents of SB 349 welcome conversations around reliability and resource adequacy. But the conversations must be balanced. After all, the issues impacting the provision of safe, reliable, and resilient electric service in the Commonwealth are complex and one cannot responsibly evaluate the issues by narrowly concentrating on one input – or fuel source – to the exclusion of all other inputs. An appropriate examination of the issues requires consideration of the many factors that impact the ability to deliver power into and within the Commonwealth of Kentucky; respectfully, SB 349 is not the answer. If lawmakers truly intend an “all of the above” approach to advance the “long-term, economic health and well-being” of their constituents, they must encourage a comprehensive and collaborative conversation around resource adequacy and deliverability. Such an approach is necessary to avoid more unintended consequences that will only serve to make the grid less reliable, and more expensive for Kentucky consumers.

Duke Energy believes that the best approach to resolving the closely intertwined issues of reliability and affordability is not to rush through legislation developed in one Chamber of the General Assembly. Rather, we would propose creating a working group comprised of utilities, the regional transmission organizations, our fuel suppliers, regulators, legislators, and customers to study the concerns relating to reliability and how best to address them. This diverse group would assess the jurisdictional limits of the state and what viable solutions it might advance. Importantly, this working group should identify the operational impracticalities of and significant financial burden that would be created in trying to transmit electricity from one corner of the

**JOINT INTERVENORS
HEARING EXHIBIT 2**

The Honorable David Osborne, Speaker, and
Members of the Kentucky House of Representatives
March 25, 2024
Page Two

Commonwealth to the other. SB 349 enables neither such a holistic examination nor objective solution-driven results.

SB 349 does impose undue cost on our customers for a newly formed commission that will duplicate the good work already performed by regulators, grid operators, governmental agencies, and utility companies, all with subject matter expertise. And to the extent this existing, recurring work has a single motivation, it is to strike the right balance between continued access to safe, reliable, affordable power and financially sound utility companies able to invest in their systems to fulfill their service obligations. SB 349 does not strike a balance. The mandates under SB 349 will force continued investment in aging plants and prevent investment in new generation that will carry Kentucky forward. The mandates of SB 349 will ostensibly tax Kentuckians in order to keep uneconomic coal plants online, overlooking the operational reality that uneconomic plants do not reliably dispatch power. Additionally, SB 349's directive that a newly formed commission look across the Commonwealth and determine if there are reliability concerns that could be addressed by denying the closure of a power unit is not realistic. Such a directive ignores the complex structure of transmission systems and resulting significant costs. If such a directive were carried out as contemplated under SB 349, customers of a utility – your constituents – may be required to pay for the operation and maintenance of a power plant that is not serving them.

We have already seen examples of unintended consequences from SB 4, rushed into law last year. That legislation was a significant departure from Kentucky's least-cost energy planning. The Public Service Commission denied our ability to recover costs associated with the future decommissioning our East Bend plant as part of our current rates. This will have the effect of shifting approximately \$50-\$100 million in costs from those customers who are currently benefitting from East Bend's operation to future customers who will be required to pay for these stranded costs in addition to the costs of new generation. SB 349 would also further restrict our ability to manage energy planning effectively, making the process of building new, reliable generation less efficient and more costly for future Kentucky customers.

I urge House Members to vote against SB 349 as written and to explore creating a working group where we can come together to solve this problem in a way that benefits all Kentuckians.

Sincerely,



Amy B. Spiller



Inputs for Calculations

Values used in COSS Unit

Costs	TARIFF	Rate Nov 1, 2023	Energy Rates / kWh
Energy			
	0.046797 RS		0.099654
	0.003497 # 78 (DSMR)		0.003497
	0.009404 # 80 (FAC)		0.009404
	(0.002596) # 82 (PSM)		(0.002596)
	0.005933 # 76 (ESM) Converted to \$/kWh...not used		0.011425
	0.063035 Total		0.121384
Demand	10.39% # 76 (ESM) Percentage	10.39%	
\$	29.416	COSS 12-CP Demand Unit Cost	\$ 29.416

0.057132	Proposed Excess Generation Credit	0.057132	0.057132
	Average system size kW DC	7.08	
	Rate RS - Customer Charge is \$13.00 / month		
	Home Energy Assistance HEA Charge is \$0.30 / month		

Targeted Solar Output % of PreSolar

80.00%

12-CP System Peak Hours from COSS	Hour
1/26/2022	8:00
2/8/2022	8:00
3/12/2022	20:00
4/28/2021	15:00
5/24/2021	17:00
6/29/2021	16:00
7/6/2021	17:00
8/12/2021	16:00
9/14/2021	17:00
10/11/2021	17:00
11/23/2021	8:00
12/7/2021	18:00

DUKE ENERGY KENTUCKY, INC.
 ELECTRIC COST OF SERVICE STUDY
 CASE NO: 2022-00372
 ALLOCATION FACTORS FOR COST OF SERVICE STUDY
 TWELVE MONTHS ENDING MARCH 31, 2022

**KYSEIA
 HEARING EXHIBIT 2**

KYPSC Case No. 2023-00413
 (SEIA-DR-02-011 Attachment
 Page 86 of 116

Work Paper FR-16(7)(v)
 Witness Responsible:
 James E. Ziolkowski
 Page 39

MONTHLY STATISTICS
 RESIDENTIAL - RS RATE GROUP
 APRIL 2021 THROUGH MARCH 2022

DATE	NUMBER OF CUSTOMERS		SAMPLE AVG. USAGE	AVERAGE NCP	GROUP COINCIDENT DEMAND		SYSTEM COINCIDENT DEMAND		NCD LOAD FACTOR	GROUP COIN LOAD FACTOR	SYSTEM COIN LOAD FACTOR
	OBSERVED	POPULATION	KWH	KW	KW	DATE-TIME	KW	DATE-TIME			
January		134,850	1,232	6.306	2.405	01/26/22 08:00	2.405	01/26/22 08:00	26.25	68.83	68.83
February		135,005	977	5.982	2.198	02/03/22 19:00	2.067	02/08/22 08:00	24.30	66.11	70.32
March		135,008	795	5.631	1.919	03/12/22 20:00	1.919	03/12/22 20:00	18.98	55.70	55.70
April		133,975	681	5.442	1.625	04/01/21 20:00	1.229	04/28/21 15:00	17.38	58.21	76.93
May		134,092	761	5.608	2.398	05/24/21 18:00	2.353	05/24/21 17:00	18.24	42.64	43.46
June		134,196	1,027	5.754	2.791	06/29/21 17:00	2.701	06/29/21 16:00	24.79	51.09	52.80
July		134,259	1,168	5.756	2.724	07/06/21 18:00	2.694	07/06/21 17:00	27.28	57.66	58.30
August		134,355	1,204	6.023	2.855	08/24/21 18:00	2.766	08/12/21 16:00	26.88	56.70	58.53
September		134,426	878	5.869	2.398	09/14/21 17:00	2.398	09/14/21 17:00	20.77	50.83	50.83
October		134,487	723	5.251	1.972	10/10/21 17:00	1.853	10/11/21 17:00	18.52	49.31	52.49
November		134,601	841	5.595	1.746	11/23/21 08:00	1.746	11/23/21 08:00	20.87	66.85	66.85
December		134,723	912	5.713	1.944	12/07/21 19:00	1.898	12/07/21 18:00	21.46	63.09	64.62

Note: All hours are in EST

Rate Class	Date	Hour	AVGCLUST_PRESOLAR	PV Watts 7.0815 kwDC	Pre Solar less Solar output (all values)	AVGCLUST_POSTSOLAR (Import Only)	blank1	blank2	blank3	Export	System Peak Hour used In COSS Pre-Solar	System Peak Hour used In COSS Post-Solar	Month
KY_RS	04/01/2021	1	1.0128	0.0000	1.0128	1.0128				0.0000			4
KY_RS	04/01/2021	2	0.9790	0.0000	0.9790	0.9790				0.0000			4
KY_RS	04/01/2021	3	0.9760	0.0000	0.9760	0.9760				0.0000			4
KY_RS	04/01/2021	4	0.9904	0.0000	0.9904	0.9904				0.0000			4
KY_RS	04/01/2021	5	1.0294	0.0000	1.0294	1.0294				0.0000			4
KY_RS	04/01/2021	6	1.1233	0.0000	1.1233	1.1233				0.0000			4
KY_RS	04/01/2021	7	1.2680	0.0000	1.2680	1.2680				0.0000			4
KY_RS	04/01/2021	8	1.3669	0.4271	0.9398	0.9398				0.0000			4
KY_RS	04/01/2021	9	1.3517	0.4528	0.8989	0.8989				0.0000			4
KY_RS	04/01/2021	10	1.2675	0.3052	0.9624	0.9624				0.0000			4
KY_RS	04/01/2021	11	1.2506	1.4562	(0.2055)	0.0000				(0.2055)			4
KY_RS	04/01/2021	12	1.2899	3.9058	(2.6159)	0.0000				(2.6159)			4
KY_RS	04/01/2021	13	1.2453	1.6755	(0.4303)	0.0000				(0.4303)			4
KY_RS	04/01/2021	14	1.2466	1.7270	(0.4803)	0.0000				(0.4803)			4
KY_RS	04/01/2021	15	1.2515	3.4092	(2.1577)	0.0000				(2.1577)			4
KY_RS	04/01/2021	16	1.2986	1.0084	0.2902	0.2902				0.0000			4
KY_RS	04/01/2021	17	1.3739	1.7712	(0.3973)	0.0000				(0.3973)			4
KY_RS	04/01/2021	18	1.4645	0.0612	1.4033	1.4033				0.0000			4
KY_RS	04/01/2021	19	1.5206	0.1190	1.4016	1.4016				0.0000			4
KY_RS	04/01/2021	20	1.5572	0.0000	1.5572	1.5572				0.0000			4
KY_RS	04/01/2021	21	1.5993	0.0000	1.5993	1.5993				0.0000			4
KY_RS	04/01/2021	22	1.5519	0.0000	1.5519	1.5519				0.0000			4
KY_RS	04/01/2021	23	1.4325	0.0000	1.4325	1.4325				0.0000			4
KY_RS	04/01/2021	24	1.3219	0.0000	1.3219	1.3219				0.0000			4
KY_RS	04/02/2021	1	1.2415	0.0000	1.2415	1.2415				0.0000			4
KY_RS	04/02/2021	2	1.2115	0.0000	1.2115	1.2115				0.0000			4
KY_RS	04/02/2021	3	1.2078	0.0000	1.2078	1.2078				0.0000			4
KY_RS	04/02/2021	4	1.2216	0.0000	1.2216	1.2216				0.0000			4
KY_RS	04/02/2021	5	1.2622	0.0000	1.2622	1.2622				0.0000			4
KY_RS	04/02/2021	6	1.3467	0.0000	1.3467	1.3467				0.0000			4
KY_RS	04/02/2021	7	1.4756	0.0074	1.4682	1.4682				0.0000			4
KY_RS	04/02/2021	8	1.5770	0.9574	0.6196	0.6196				0.0000			4
KY_RS	04/02/2021	9	1.5197	2.5448	(1.0251)	0.0000				(1.0251)			4
KY_RS	04/02/2021	10	1.4139	3.8238	(2.4099)	0.0000				(2.4099)			4
KY_RS	04/02/2021	11	1.3177	4.7084	(3.3907)	0.0000				(3.3907)			4
KY_RS	04/02/2021	12	1.2419	5.2281	(3.9862)	0.0000				(3.9862)			4
KY_RS	04/02/2021	13	1.1856	5.4329	(4.2473)	0.0000				(4.2473)			4
KY_RS	04/02/2021	14	1.1236	5.2879	(4.1643)	0.0000				(4.1643)			4
KY_RS	04/02/2021	15	1.0640	4.8704	(3.8064)	0.0000				(3.8064)			4
KY_RS	04/02/2021	16	1.0273	4.1178	(3.0906)	0.0000				(3.0906)			4
KY_RS	04/02/2021	17	1.0265	3.0222	(1.9957)	0.0000				(1.9957)			4
KY_RS	04/02/2021	18	1.0471	1.5177	(0.4706)	0.0000				(0.4706)			4
KY_RS	04/02/2021	19	1.0526	0.2115	0.8411	0.8411				0.0000			4
KY_RS	04/02/2021	20	1.0917	0.0000	1.0917	1.0917				0.0000			4
KY_RS	04/02/2021	21	1.1896	0.0000	1.1896	1.1896				0.0000			4
KY_RS	04/02/2021	22	1.2328	0.0000	1.2328	1.2328				0.0000			4
KY_RS	04/02/2021	23	1.2047	0.0000	1.2047	1.2047				0.0000			4
KY_RS	04/02/2021	24	1.1479	0.0000	1.1479	1.1479				0.0000			4
KY_RS	04/03/2021	1	1.1003	0.0000	1.1003	1.1003				0.0000			4
KY_RS	04/03/2021	2	1.0720	0.0000	1.0720	1.0720				0.0000			4
KY_RS	04/03/2021	3	1.0633	0.0000	1.0633	1.0633				0.0000			4
KY_RS	04/03/2021	4	1.0769	0.0000	1.0769	1.0769				0.0000			4
KY_RS	04/03/2021	5	1.0986	0.0000	1.0986	1.0986				0.0000			4
KY_RS	04/03/2021	6	1.1428	0.0000	1.1428	1.1428				0.0000			4
KY_RS	04/03/2021	7	1.2071	0.0000	1.2071	1.2071				0.0000			4
KY_RS	04/03/2021	8	1.3145	0.3012	1.0133	1.0133				0.0000			4
KY_RS	04/03/2021	9	1.3657	1.2067	0.1590	0.1590				0.0000			4
KY_RS	04/03/2021	10	1.3436	1.6135	(0.2699)	0.0000				(0.2699)			4
KY_RS	04/03/2021	11	1.2908	0.7059	0.5849	0.5849				0.0000			4
KY_RS	04/03/2021	12	1.2454	1.1220	0.1234	0.1234				0.0000			4
KY_RS	04/03/2021	13	1.1689	0.7319	0.4369	0.4369				0.0000			4
KY_RS	04/03/2021	14	1.0902	1.1594	(0.0692)	0.0000				(0.0692)			4
KY_RS	04/03/2021	15	1.0209	1.1696	(0.1486)	0.0000				(0.1486)			4
KY_RS	04/03/2021	16	0.9744	0.7067	0.2677	0.2677				0.0000			4
KY_RS	04/03/2021	17	0.9538	0.1236	0.8302	0.8302				0.0000			4
KY_RS	04/03/2021	18	0.9578	0.0435	0.9143	0.9143				0.0000			4
KY_RS	04/03/2021	19	0.9611	0.0000	0.9611	0.9611				0.0000			4
KY_RS	04/03/2021	20	0.9785	0.0000	0.9785	0.9785				0.0000			4
KY_RS	04/03/2021	21	1.0473	0.0000	1.0473	1.0473				0.0000			4
KY_RS	04/03/2021	22	1.0518	0.0000	1.0518	1.0518				0.0000			4
KY_RS	04/03/2021	23	1.0016	0.0000	1.0016	1.0016				0.0000			4
KY_RS	04/03/2021	24	0.9293	0.0000	0.9293	0.9293				0.0000			4
KY_RS	04/04/2021	1	0.8449	0.0000	0.8449	0.8449				0.0000			4
KY_RS	04/04/2021	2	0.7874	0.0000	0.7874	0.7874				0.0000			4
KY_RS	04/04/2021	3	0.7606	0.0000	0.7606	0.7606				0.0000			4
KY_RS	04/04/2021	4	0.7552	0.0000	0.7552	0.7552				0.0000			4
KY_RS	04/04/2021	5	0.7627	0.0000	0.7627	0.7627				0.0000			4
KY_RS	04/04/2021	6	0.7976	0.0000	0.7976	0.7976				0.0000			4



**KYSEIA
HEARING EXHIBIT 3**

Rate Class	Date	Hour	AVGCUST_PRE SOLAR	PV Watts 7.0815 kWDC	Pre Solar less Solar output (all values)	AVGCUST_POSTSOL AR (Import Only)	Export	System Peak Hour used in COSS Pre-Solar	System Peak Hour used in COSS Post-	Month
KY_RS	04/01/2021	1	1.0128	0.0000	1.0128	1.0128	0.0000			4
KY_RS	04/01/2021	2	0.9790	0.0000	0.9790	0.9790	0.0000			4
KY_RS	04/01/2021	3	0.9760	0.0000	0.9760	0.9760	0.0000			4
KY_RS	04/01/2021	4	0.9904	0.0000	0.9904	0.9904	0.0000			4
KY_RS	04/01/2021	5	1.0294	0.0000	1.0294	1.0294	0.0000			4
KY_RS	04/01/2021	6	1.1233	0.0000	1.1233	1.1233	0.0000			4
KY_RS	04/01/2021	7	1.2680	0.0000	1.2680	1.2680	0.0000			4
KY_RS	04/01/2021	8	1.3669	0.4271	0.9398	0.9398	0.0000			4
KY_RS	04/01/2021	9	1.3517	0.4528	0.8989	0.8989	0.0000			4
KY_RS	04/01/2021	10	1.2675	0.3052	0.9624	0.9624	0.0000			4
KY_RS	04/01/2021	11	1.2506	1.4562	(0.2055)	0.0000	(0.2055)			4
KY_RS	04/01/2021	12	1.2899	3.9058	(2.6159)	0.0000	(2.6159)			4
KY_RS	04/01/2021	13	1.2453	1.6755	(0.4303)	0.0000	(0.4303)			4
KY_RS	04/01/2021	14	1.2466	1.7270	(0.4803)	0.0000	(0.4803)			4
KY_RS	04/01/2021	15	1.2515	3.4092	(2.1577)	0.0000	(2.1577)			4
KY_RS	04/01/2021	16	1.2986	1.0084	0.2902	0.2902	0.0000			4
KY_RS	04/01/2021	17	1.3739	1.7712	(0.3973)	0.0000	(0.3973)			4
KY_RS	04/01/2021	18	1.4645	0.0612	1.4033	1.4033	0.0000			4
KY_RS	04/01/2021	19	1.5206	0.1190	1.4016	1.4016	0.0000			4
KY_RS	04/01/2021	20	1.5572	0.0000	1.5572	1.5572	0.0000			4
KY_RS	04/01/2021	21	1.5993	0.0000	1.5993	1.5993	0.0000			4
KY_RS	04/01/2021	22	1.5519	0.0000	1.5519	1.5519	0.0000			4
KY_RS	04/01/2021	23	1.4325	0.0000	1.4325	1.4325	0.0000			4
KY_RS	04/01/2021	24	1.3219	0.0000	1.3219	1.3219	0.0000			4



Rate Class	Date	Hour	Usage	AVG CUST
KY_RS	03/11/2022	17	151,570.49	1.1288
KY_RS	03/11/2022	18	172,939.91	1.28795
KY_RS	03/11/2022	19	191,745.18	1.428
KY_RS	03/11/2022	20	202,266.71	1.50636
KY_RS	03/11/2022	21	203,750.17	1.5174
KY_RS	03/11/2022	22	203,425.86	1.51499
KY_RS	03/11/2022	23	194,680.52	1.44986
KY_RS	03/11/2022	24	184,218.07	1.37194
KY_RS	03/12/2022	1	178,623.16	1.33027
KY_RS	03/12/2022	2	176,635.10	1.31547
KY_RS	03/12/2022	3	178,560.90	1.32981
KY_RS	03/12/2022	4	181,018.25	1.34811
KY_RS	03/12/2022	5	186,441.66	1.3885
KY_RS	03/12/2022	6	193,879.67	1.44389
KY_RS	03/12/2022	7	206,027.23	1.53436
KY_RS	03/12/2022	8	223,840.84	1.66703
KY_RS	03/12/2022	9	234,219.47	1.74432
KY_RS	03/12/2022	10	235,292.73	1.75231
KY_RS	03/12/2022	11	240,934.13	1.79433
KY_RS	03/12/2022	12	241,931.37	1.80175
KY_RS	03/12/2022	13	241,797.78	1.80076
KY_RS	03/12/2022	14	238,776.32	1.77826
KY_RS	03/12/2022	15	233,453.41	1.73862
KY_RS	03/12/2022	16	225,548.32	1.67974
KY_RS	03/12/2022	17	223,182.57	1.66212
KY_RS	03/12/2022	18	226,939.42	1.6901
KY_RS	03/12/2022	19	242,986.32	1.80961
KY_RS	03/12/2022	20	253,722.82	1.88957
KY_RS	03/12/2022	21	251,334.83	1.87178
KY_RS	03/12/2022	22	245,476.63	1.82816
KY_RS	03/12/2022	23	235,093.09	1.75083
KY_RS	03/12/2022	24	225,016.18	1.67578
KY_RS	03/13/2022	1	220,407.46	1.64146
KY_RS	03/13/2022	2	217,247.62	1.61792
KY_RS	03/13/2022	4	217,103.07	1.61685
KY_RS	03/13/2022	5	217,949.88	1.62315
KY_RS	03/13/2022	6	218,160.97	1.62473
KY_RS	03/13/2022	7	220,835.65	1.64465
KY_RS	03/13/2022	8	227,216.90	1.69217
KY_RS	03/13/2022	9	238,651.71	1.77733
KY_RS	03/13/2022	10	247,731.32	1.84495
KY_RS	03/13/2022	11	248,669.32	1.85193
KY_RS	03/13/2022	12	230,369.91	1.71565
KY_RS	03/13/2022	13	222,760.56	1.65898
KY_RS	03/13/2022	14	213,311.75	1.58861
KY_RS	03/13/2022	15	203,584.31	1.51617
KY_RS	03/13/2022	16	189,842.45	1.41383

EXHIBIT
5

Month	Day	Hour	Beam Irradiance (W/m2)	Diffuse Irradiance (W/m2)	Ambient Temperature (C)	Wind Speed (m/s)	Albedo	Plane of Array Irradiance (W/m2)	Cell Temperature (C)	DC Array Output (W)	AC System Output (W)	AC System Output (kW)
3	11	20	0	0	1	0.6	0.12	0	1	0	0	0
3	11	21	0	0	1	0.5	0.12	0	1	0	0	0
3	11	22	0	0	2	0.7	0.12	0	2	0	0	0
3	11	23	0	0	3	0.5	0.12	0	3	0	0	0
3	12	0	0	0	3	0.4	0.12	0	3	0	0	0
3	12	1	0	0	3	0.5	0.12	0	3	0	0	0
3	12	2	0	0	2	0.5	0.12	0	2	0	0	0
3	12	3	0	0	1	0.6	0.12	0	1	0	0	0
3	12	4	0	0	2	0.6	0.12	0	2	0	0	0
3	12	5	0	0	2	0.6	0.12	0	2	0	0	0
3	12	6	0	0	2	0.5	0.12	0	2	0	0	0
3	12	7	0	4	3	0.3	0.12	3.771	3.16	19.539	0	0
3	12	8	0	73	3	0.3	0.12	69.569	5.999	428.81	385.547	0.385547
3	12	9	0	128	5	0.4	0.12	123.123	10.138	755.922	701.069	0.701069
3	12	10	10	203	6	0.4	0.12	205.454	14.553	1249.407	1177.067	1.177067
3	12	11	26	271	8	0.4	0.12	289.572	20.038	1731.67	1642.242	1.642242
3	12	12	45	320	10	0.3	0.12	371.905	25.93	2183.004	2077.584	2.077584
3	12	13	65	332	11	0.3	0.12	402.886	28.264	2351.206	2239.825	2.239825
3	12	14	23	252	11	0.2	0.12	266.741	22.801	1577.735	1493.761	1.493761
3	12	15	161	253	10	0.2	0.12	380.042	26.878	2263.892	2155.606	2.155606
3	12	16	0	113	9	0.2	0.12	108.608	13.827	657.178	605.823	0.605823
3	12	17	0	72	8	0.3	0.12	69.34	10.986	416.827	373.989	0.373989
3	12	18	0	4	7	0.4	0.12	3.879	7.14	13.628	0	0
3	12	19	0	0	7	0.5	0.12	0	7	0	0	0
3	12	20	0	0	7	0.5	0.12	0	7	0	0	0
3	12	21	0	0	6	0.4	0.12	0	6	0	0	0
3	12	22	0	0	4	0.4	0.12	0	4	0	0	0
3	12	23	0	0	4	0.4	0.12	0	4	0	0	0
3	13	0	0	0	4	0.3	0.12	0	4	0	0	0
3	13	1	0	0	4	0.2	0.12	0	4	0	0	0
3	13	2	0	0	4	0.2	0.12	0	4	0	0	0
3	13	3	0	0	5	0.2	0.12	0	5	0	0	0
3	13	4	0	0	4	0.2	0.12	0	4	0	0	0
3	13	5	0	0	4	0.2	0.12	0	4	0	0	0
3	13	6	0	0	4	0.2	0.12	0	4	0	0	0
3	13	7	0	3	5	0.3	0.12	2.828	5.12	14.423	0	0
3	13	8	0	76	7	0.5	0.12	72.491	9.944	440.476	396.8	0.3968
3	13	9	36	188	10	0.6	0.12	211.589	18.337	1284.008	1210.443	1.210443
3	13	10	5	187	13	0.5	0.12	185.265	20.487	1096.276	1029.363	1.029363
3	13	11	151	340	15	0.5	0.12	495.732	35.036	2841.125	2712.384	2.712384
3	13	12	365	331	16	0.5	0.12	704.628	44.502	3910.668	3744.03	3.74403
3	13	13	856	142	17	0.7	0.12	954.301	53.578	5138.578	4928.43	4.92843
3	13	14	834	134	17	0.8	0.12	859.393	49.094	4740.226	4544.193	4.544193



PVWatts Version 5 Manual

Aron P. Dobos

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Technical Report
NREL/TP-6A20-62641
September 2014

**KYSEIA
HEARING EXHIBIT 6**

Contract No. DE-AC36-08GO28308

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PVWatts Version 5 Manual

Aron P. Dobos

September 4, 2014

Abstract

The NREL PVWatts[®] calculator is a web application developed by the National Renewable Energy Laboratory (NREL) that estimates the electricity production of a grid-connected photovoltaic system based on a few simple inputs. PVWatts combines a number of sub-models to predict overall system performance, and includes several built-in parameters that are hidden from the user. This technical reference manual describes the sub-models, documents hidden parameters and assumptions for default values, and explains the sequence of calculations that yield the final system energy production estimate. This reference applies to the significantly revised version of PVWatts released by NREL in 2014.

Keywords: *photovoltaics, PVWatts, systems modeling, solar analysis*

1 Introduction and History

PVWatts is a popular web application for estimating the energy production of a grid-connected photovoltaic (PV) system. It is designed to be simple to use and understand for non-experts and more advanced users alike. PVWatts hides much of the complexity of accurately modeling PV systems from the user by making several assumptions about the type, configuration, and operation of the system. Consequently, the results should be interpreted as being a representative estimate for a similar actual system operating in a year with typical weather. The errors may be as high as $\pm 10\%$ for annual energy totals and $\pm 30\%$ for monthly totals for weather data representing long-term historical typical conditions. Actual performance in a specific year may deviate from the long-term average up to $\pm 20\%$ for annual and $\pm 40\%$ for monthly values.

PVWatts has been online since 1999, and the original algorithms in version 1 were largely based on the approach of the Sandia PVFORM tool developed in the 1980s. A technical reference manual for PVWatts version 1 is available in [1]. Since then, several versions of PVWatts have been made available, though the system performance calculations have remained largely the same as version 1. The version history is shown in Table 1.

In 2013, NREL began the process of revamping the PVWatts online web application to update the visual appeal and functionality, consolidate versions to reduce the ongoing maintenance burden, and update the energy prediction algorithms to be in line with the actual performance of modern photovoltaic systems.

While PVWatts is a useful tool for obtaining a quick estimate of energy production from a photovoltaic system, several more sophisticated tools are available for making more accurate predictions. The System Advisor Model (SAM) is a free desktop application developed by NREL that allows users to model PV systems in much greater detail [4]. SAM also includes detailed economic analysis for residential, commercial, and utility-scale systems, as well as performance models for concentrating solar power (CSP), wind, solar water heating, and geothermal systems.

Table 1. Version History

Version	Description	Weather Data Options	Date	Status
V1	Original online calculator.	239 TMY2 sites. Added 360 international sites in 2005.	1998	Retiring in 2014
V2	Modified to utilize a gridded 40 km monthly weather data in the continental US. Hourly calculations were done with the nearest TMY2 site, and then the monthly totals were scaled using the monthly gridded weather data.	Monthly 40-km gridded irradiance & temperature (CSR)	2001	Retiring in 2014
SOAP	A web service version of V2 using the SOAP protocol for monthly predictions.	Same as V2	2003	Retiring in 2014
V3	Web service version of the hourly PVWatts V1 using the 10-km hourly satellite-based irradiance dataset. Included a simplified economic cash flow calculation.	NREL/Clean Power Research Perez 10-km satellite-based irradiance, typical files created from 1998-2005 period of record	2009	Defunct in 2012
V4	Updated REST-ful web service of the hourly PVWatts V1 on http://developer.nrel.gov	239 TMY2s, 1020 TMY3s, 360 International, 10 km CPR/Perez 1998-2009 typical satellite	2012	Operational
V5	Completely new web application user interface, updated calculation engine (described here). Available at http://pvwatts.nrel.gov . Also available as a web service on http://developer.nrel.gov	1020 Class I and II TMY3s (default), 239 TMY2s, 360 International, 10 km CPR/Perez 1998-2009 typical satellite	2014	September 2014

PVsyst is another option for detailed PV performance modeling, and is a commercial software product [5].

2 Overview of Changes in Version 5

PVWatts version 5 is a comprehensive update of both default values and algorithms. The changes are designed to more accurately model typical systems while keeping the number of inputs to a minimum, and to provide a way to differentiate between common technology options without posing an undue technical burden upon the user.

For reference, previous versions of the PVWatts calculations are described in [1]. The key changes in PVWatts V5 are:

1. Option to select "Standard", "Premium", or "Thin film" module type.
2. Option to specify a DC-to-AC nameplate sizing ratio.
3. Module model no longer includes a quadratic correction at low light levels.

4. Total system losses are specified as a percentage, with a default value of 14 %. This replaces the former DC-to-AC derate factor in PVWatts V1.
5. Inverter efficiency curve is derived from statistical analysis of data on inverters manufactured since 2010. The nominal inverter efficiency can be entered by the user.
6. One-axis tracking systems either estimate linear beam+diffuse self-shading losses based on row spacing, or use backtracking.
7. Albedo is fixed at 0.2 unless explicitly specified at each hour in a TMY3, EPW, or SAM/CSV weather file.

3 Model Inputs

PVWatts requires the minimal set of PV system specifications as listed in Table 2. Other performance parameters such as module temperature coefficients are hidden from the user.

Table 2. Input Parameters

Field	Units	Default Value
System size	kW (DC)	4
Module type	Standard, Premium, Thin film	Standard
System losses	%	14
Array type	Fixed open rack, Fixed roof mount, 1-Axis, Backtracked 1-Axis, 2-Axis	Fixed open rack
Tilt angle	degrees	Site Latitude
Azimuth angle	degrees	180° in northern hemisphere, 0° in southern hemisphere
<i>Advanced inputs</i>		
DC/AC ratio	ratio	1.1
Inverter efficiency	%	96
GCR (1 Axis only)	fraction	0.4

The new module type input is designed to help differentiate between different technology options. The “standard” option represents typical poly- or mono-crystalline silicon modules, with efficiencies in the range of 14-17 %. The “premium” option is appropriate for modeling high efficiency (~18-20 %) monocrystalline silicon modules that have anti-reflective coatings and lower temperature coefficients. The thin film option assumes a low efficiency (~11 %), and a significantly lower temperature coefficient which is representative of most installed thin film modules as of 2013. It is important to note that less common thin film module technologies may have quite different temperature coefficients than the default. The model assumptions for each model type are listed in Table 3. It is up to the user to select the most appropriate option for the type of module being considered based on information on the module data sheet. The “standard” option is appropriate for typical preliminary analyses and is most similar to PVWatts V1.

The new advanced inputs allow the user to specify a DC-to-AC sizing ratio and ground coverage ratio, which was not possible in older versions of PVWatts. PVWatts V1 assumed that the DC nameplate capacity of the system was equal to the AC nameplate capacity. In modern

Table 3. Assumptions for different module types

Module type	Efficiency	Cover type	Temperature coefficient
Standard	~15 %	Glass	-0.47 %/°C
Premium	~19 %	Anti-reflective	-0.35 %/°C
Thin film	~10 %	Glass	-0.20 %/°C

systems, the photovoltaic array is often sized so that its DC rating is higher than the inverter's AC rating. Depending on location, this may be desirable to capture more energy during the beginning and end of the day, despite possibly clipping output at peak sun hours. The default value of the new DC-to-AC ratio input is 1.1. For a 4 kW DC system, this would result in a 3.63 kW AC inverter rating.

The ground coverage ratio (GCR) only applies to one axis tracking systems. It is a measure of the total module area relative to the roof or ground space occupied by the array. A GCR of 0.5 means that for a horizontal roof or ground surface, half of the total area is covered by modules when the tracker is rotated such that they are horizontal. A lower GCR means wider spacing between rows, and a higher one means that rows are spaced closer together. A GCR of 1 indicates no space between adjacent rows, and a GCR of 0 means essentially infinite spacing between rows. Typical one axis tracker systems have GCRs in the range of 0.3 to 0.6, and the default value in PVWatts is 0.4. Previous versions of PVWatts effectively assumed a GCR of zero, which is impossible to achieve in practice.

4 Solar Resource

PVWatts requires hourly data for one year for two components of solar irradiance (beam and diffuse), ambient dry bulb temperature, and wind speed at 10 m above the ground. Each hour be timestamped with the year, month, day, and hour corresponding to the data line so that the sun position can be accurately calculated.

No adjustments are made for leap years or daylight savings time: hence, "hourly data" in this context implies 8.760 data points for one year. The required data are listed in Tables 4 and 5.

Table 4. Header Information

Field	Units
Latitude	degrees
Longitude	degrees
Time zone	hours offset from Greenwich Mean Time
Site elevation	meters above sea level

PVWatts can read solar resource data files from different sources and in different formats, including the National Solar Radiation Database (NSRDB) 1961-1990 data (TMY2) and 1991-2010 update (TMY3), and EnergyPlus weather files. It also reads files in the SAM CSV format [4], which is a generic format suitable for custom solar resource data sets. The PVWatts web application interacts with three online databases to access solar resource data, but does not allow users to specify their own weather data.

Table 5. Hourly Input Data Fields

Field	Units/Values
Year	1950-2050
Month	1-12
Day	1-31
Hour	0-23
Direct normal irradiance (DNI)	W/m ²
Diffuse horizontal irradiance (DHI)	W/m ²
Ambient dry bulb temperature	Celsius
Wind speed at 10 m	m/s
Albedo (<i>optional, typically in TMY3 files</i>)	[0..1]

Change from PVWatts V1 In PVWatts V1, the albedo was changed to 0.6 for hours with a positive snow depth when using a TMY2 file. This increased system output, assuming the modules were cleaned regularly of any snow cover. Now, PVWatts assumes an albedo of 0.2 for all hours of the year for TMY2 files, and uses the hourly value provided in TMY3 files.

5 Sun Position

At each hour, PVWatts calculates the sun position using the algorithm described in [6]. The sun position is calculated at the midpoint of the hour: for example, from 2 p.m. to 3 p.m., the sun position is calculated at 2:30 p.m. to determine the solar zenith and azimuth angles. This is the case for normal daytime hours during which the sun is above the horizon for the whole hour.

For the sunrise hour, the midpoint between the sunrise time and the end of the timestep is used for the sun position calculation. Similarly, the midpoint between the beginning of the timestep and sunset time is used for the sunset hour.

6 Tracking

PVWatts performs angle of incidence (AOI) (α) calculations for fixed, one-axis, or two-axis tracking systems.

Fixed systems implement standard geometrical calculations for the angle of incidence given surface tilt β , surface azimuth γ , solar azimuth γ_{sun} , and solar zenith θ_{sun} angles, as listed in Eqn. 1.

$$\alpha_{fixed} = \cos^{-1} [\sin(\theta_{sun}) \cos(\gamma - \gamma_{sun}) \sin(\beta) + \cos(\theta_{sun}) \cos(\beta)] \quad (1)$$

For one axis trackers, the algorithm documented in [10] is used. It assumes ideal tracking and does not account for any shading. The one-axis tracking algorithm assumes a hard-coded rotation limit of ± 45 degrees from the horizontal. PVWatts uses a separate algorithm to calculate the fraction of each row that is shaded by adjacent rows based on the ground coverage ratio (GCR), and reduces the beam and diffuse irradiance incident on each row accordingly. When the backtracking option is enabled, PVWatts uses the SAM backtracking algorithm to avoid self-shading of adjacent rows. For details on these algorithms, consult [25].

Change from PVWatts V1 In PVWatts V1, one axis tracking assumed no self-shading or backtracking. This is an unrealistic assumption for most installed systems, as tracking rows cannot be spaced infinitely apart. Consequently, the production estimates for one axis tracked systems will be reduced relative to PVWatts V1.

For two axis tracking systems, the PV surface tilt and azimuth are set equal to the sun zenith angle and the sun azimuth angle, respectively, and the incidence angle is zero. The two axis tracking algorithm assumes no shading.

7 Plane-of-Array Irradiance

The plane-of-array (POA) beam, sky diffuse, and ground-reflected diffuse irradiance components are calculated using the Perez 1990 algorithm [7]. The POA beam component I_b is simply the beam normal input multiplied by the cosine of the angle of incidence. The isotropic, circumsolar, and horizon brightening diffuse terms are calculated from the beam and diffuse input given two empirical functions F1 and F2 as defined and are summed to yield the total sky diffuse on the surface $I_{d,sky}$. A slight modification from the standard Perez model treats the diffuse irradiance as isotropic for zenith angles between 87.5 and 90 degrees. The ground reflected irradiance $I_{d,ground}$ is treated as isotropic diffuse with a view factor calculated from the ground with respect to the tilted surface. The total POA incident on the module cover is the sum of the three components (Eqn. 2).

$$I_{poa} = I_b + I_{d,sky} + I_{d,ground} \quad (2)$$

The albedo, or ground reflectance, is by default fixed at 0.2. When using TMY3 data as input, and valid data is found in the albedo column, the hourly albedo from the data file is used.

8 Module Cover

Given the total POA irradiance incident on the module cover, PVWatts applies an AOI correction to adjust the direct beam irradiance to account for reflection losses. The correction uses a modified version of the physical model of transmittance through a module cover used in [19].

PVWatts V5 gives users the option of "Standard", "Premium", or "Thin film" modules. For standard and thin film modules, PVWatts uses a single slab, calculating the transmittance through glass with index of refraction of 1.526. This follows the treatment in [19], with the simplification of removing the absorptance term which is determined (see below) to have a negligible effect.

For the premium module option, a two slab approach is used to model both the glass and the thin anti-reflective (AR) coating that is designed to improve the angular response. The two slab model involves predicting the transmittance of irradiance through two materials. The model applies the physical representation for unpolarized radiation described in [19] twice: once for the anti-reflective (AR) coating, and subsequently for the glass cover.

First, the angle of refraction θ_2 into the AR coating is calculated with Snell's law given angle of incidence θ_1 :

$$\theta_2 = \arcsin \left(\frac{n_{air}}{n_{AR}} \sin(\theta_1) \right) \quad (3)$$

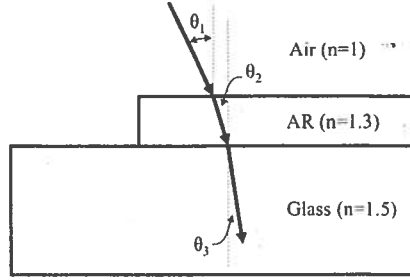


Figure 1. Diagram of two slab model

Next, the transmittance through the AR coating is calculated from Fresnel's equation for non-reflected unpolarized radiation, which takes the average of parallel and perpendicular components.

$$\tau_{AR} = 1 - 0.5 \frac{\sin(\theta_2 - \theta_1)^2}{\sin(\theta_2 + \theta_1)^2} + \frac{\tan(\theta_2 - \theta_1)^2}{\tan(\theta_2 + \theta_1)^2} \quad (4)$$

The angle of refraction into the glass cover θ_3 is again determined from Snell's law.

$$\theta_3 = \arcsin \frac{n_{AR}}{n_{glass}} \sin(\theta_2) \quad (5)$$

The transmittance through the glass is calculated similarly given θ_2 and θ_3 .

$$\tau_{glass} = 1 - 0.5 \frac{\sin(\theta_3 - \theta_2)^2}{\sin(\theta_3 + \theta_2)^2} + \frac{\tan(\theta_3 - \theta_2)^2}{\tan(\theta_3 + \theta_2)^2} \quad (6)$$

Finally, the effective transmittance through the AR coated module cover is given by:

$$\tau_{cover} = \tau_{AR}\tau_{glass} \quad (7)$$

Desoto [19] suggests using Bouguer's law to estimate the absorption, but for typical dimensions (~ 2 mm) and extinction coefficients ($K \approx 4$) in this application, the absorption is predicted to be less than 0.1 % and is thus ignored.

Given $n_{air} = 1$ and $n_{glass} = 1.526$, the angular response for two different indices of refraction for the AR coating is shown in Fig. 2. The model suggests that an AR coating yields an improvement in transmittance of about 3 % relative to standard glass at normal incidence, which is commensurate with claims made by industry (Honeywell SOLARC [20], DSM Khepricoat [21]).

Normalizing the response curve to normal incidence shows that the model predicts an improvement in light capture at high incidence angles for AR glass, which agrees with data from manufacturers of AR coated modules (Fig. 3).

Change from PVWatts V1 In PVWatts V1, the angular response correction was only applied for incidence angles greater than 50 degrees. The new approach uses a physical model instead, which makes it possible to model typical differences between standard glass and anti-reflective glass.

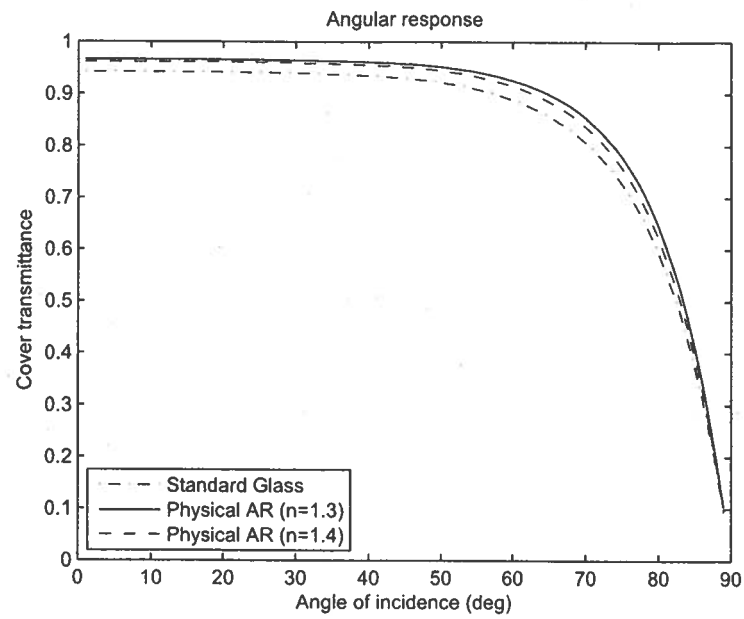


Figure 2. Two slab model angular response compared with single slab model

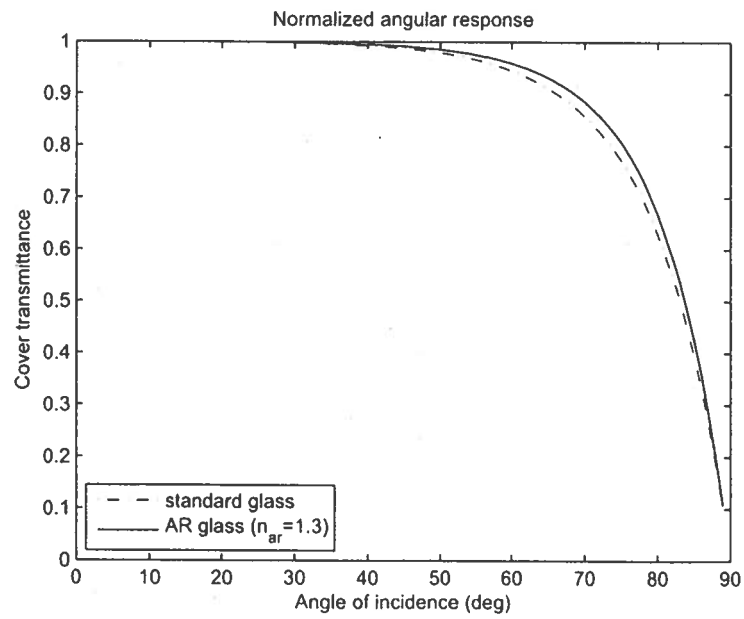


Figure 3. Two slab model angular response compared with single slab model - normalized

The AR glass option will predict slightly higher output compared with the standard option due to the improved angular response. The normal incidence transmittance of the module cover is assumed to be captured in the nameplate rating of the system. The additional energy output due to the better angular response for AR glass is slight: for a fixed south-facing system in Texas, the anti-reflective coating yielded about $\sim 0.5\%$ more energy on an annual basis. This will vary depending on location and system parameters.

9 Thermal Model

PVWatts implements a thermal model to calculate the operating cell temperature T_{cell} using a first-principles heat transfer energy balance model developed by Fuentes [15]. The Fuentes model includes effects of the thermal capacitance of the module and performs a numerical integration between timesteps to account for the thermal lag transient behavior. The thermal model uses the total incident POA irradiance, wind speed, and dry bulb temperature to calculate the operating cell temperature. PVWatts assumes a height of 5 m above the ground when correcting the wind speed in the weather data, and that the installed nominal operating cell temperature (INOCT) of the module is $45\text{ }^{\circ}\text{C}$.

Change from PVWatts V1 In PVWatts V5, fixed systems may be mounted on an open rack or a roof mount. The selection changes the assumed INOCT based on the reduced air flow and thus higher operating temperature of a roof mount system.

The Fuentes paper discusses translation of the nominal operating cell temperature (NOCT) measured at standard conditions (800 W/m^2 , 20°C ambient) to INOCT based on mounting configuration. For a roof mount system, air flow around the modules more restricted than on an open rack, and the installed nominal operating temperature will be higher. The estimate is for INOCT to be roughly $49\text{ }^{\circ}\text{C}$ for 4 inch standoffs. For fixed open rack and tracking systems, the original PVWatts V1 assumption of $45\text{ }^{\circ}\text{C}$ INOCT is retained.

10 Module Model

The PVWatts module computes the DC power from the array with a specified nameplate DC rating of P_{dc0} given a computed cell temperature T_{cell} and transmitted POA irradiance I_{tr} . The array efficiency is assumed to decrease at a linear rate as a function of temperature rise, governed by temperature coefficient γ . The reference cell temperature T_{ref} is 25°C , and reference irradiance is 1000 W/m^2 .

$$P_{dc} = \frac{I_{tr}}{1000} P_{dc0} (1 + \gamma(T_{cell} - T_{ref})) \quad (8)$$

Change from PVWatts V1 In PVWatts V1, a quadratic correction was used to reduce the output for irradiance less than 125 W/m^2 . In comparison with operating data from many systems, this behavior was not observed in modern systems, and thus the correction was removed.

The temperature coefficient depends on the module type selected. The values used were determined from a statistical analysis of over 11000 modules in the CEC module database, and are listed in Table 3.

Change from PVWatts V1 PVWatts V1 used a fixed temperature coefficient of $-0.5\%/^{\circ}\text{C}$. The new values indicate improved performance of newer modules.

11 System Losses

Losses in the system that are not explicitly modeled are provided by the user as a percentage of DC energy. Losses represented by this number include the impacts of soiling, shading, snow cover, mismatch, wiring, connections, light induced degradation, nameplate rating, system age, and operational availability. The default values are listed in Table 6, alongside the related default derates used in PVWatts V1. In V5, all wiring losses are combined into one loss category, and the inverter is explicitly modeled. Consult [12] for more information on loss assumptions.

Table 6. System Losses

Loss mechanism	Default value	Related V1 Derate
Soiling	2 %	0.95
Shading	3 %	1.0
Snow	0 %	1.0
Mismatch	2 %	0.98
Wiring	2 %	0.98
AC Wiring	-	0.99
Connections	0.5 %	0.995
Light-induced degradation	1.5 %	-
Nameplate rating	1 %	0.95
Age	0 %	1.0
Availability	3 %	0.98
Inverter	-	0.92
Total losses	14 % (via Equ. 9)	0.77

It is important to note that the total loss is not the sum of the individual losses. The total loss is calculated by multiplying the reduction due to each loss L_i (%) as shown in Eqn. 9. The default total system loss is calculated to be 14 %.

$$L_{total}(\%) = 100 \left[1 - \prod_i \left(1 - \frac{L_i}{100} \right) \right] \quad (9)$$

The default assumption for shading losses represents blocking of the horizon due to faraway features such as large buildings, mountains, or other obstructions. Surveys of installed systems indicated that the average losses due to shading on systems described as “unshaded” was roughly 3 % [14]. For a system experiencing shading due to nearby trees or structures, this loss value should be increased appropriately by using external shading software to predict shading losses, or with a onsite survey.

Light-induced degradation (LID) is a phenomenon in which the power output of a module decreases when it is exposed to sunlight for the first time. After this initial period, the module power stabilizes and subsequently follows typical long-term degradation over the lifetime of the installation (~ 0.5 %/year). The default light-induced degradation (LID) loss of 1.5 % is a typical value based on measurements of losses in different module types [13]. Some premium modules may experience lower LID losses due to their materials and construction, while others may experience LID losses greater than 1.5 %.

Change from PVWatts V1 PVWatts V1 used a DC-to-AC derate factor with a default value of 0.77. The decision was made to switch to a system loss percentage input was made to bring PVWatts in line with common practice in the industry, and to make the inputs easier to understand for people not familiar with the concept of a derate factor. The inverter efficiency is not included in the system loss, and is a separate input parameter.

To approximately convert PVWatts V5 system loss to a PVWatts V1 DC-to-AC derate factor:

1. Convert the system loss to a derate: $1 - 14/100 = 0.86$.
2. Multiply this value by the nominal inverter efficiency: $0.86 \times 0.96 = 0.825$

This suggests that the default PVWatts V5 system loss represents roughly a 7 % increase in system performance relative to PVWatts V1 due solely to updated input assumptions. The impact of the revised inverter efficiency curve in version 5 (described in next section) places the realized performance gain relative to V1 closer to 8-9 % on an annual energy basis. This behavior is commensurate with hundreds of reports from PVWatts users, an expert survey solicitation, and calibration to numerous measured datasets that suggested that the old PVWatts derate was two conservative and underpredicted modern system performance by at least 8-9 % on average.

12 Inverter Model

The inverter model in PVWatts V5 is based on an analysis of California Energy Commission (CEC) inverter performance data. Inverters newer than 2010 were included in the analysis. A "typical" inverter was selected from the dataset by first calculating an average part-load efficiency curve, and then finding the actual inverter in the dataset whose actual efficiency curve was closest to the average. The efficiency data was then fitted to a quadratic loss model as presented in [22]. The resulting performance curve is given in Eqn. 10, which scales the efficiency curve to the nominal rated efficiency specified by the user η_{nom} . The reference inverter efficiency η_{ref} from the CEC data for the actual most typical inverter is 0.9637 (P_{ac0}/P_{dc0}), and AC nameplate rating P_{ac0} is determined from the DC rating of the system and the DC-to-AC ratio. The default nominal efficiency η_{nom} is 0.96.

$$\eta = \frac{\eta_{nom}}{\eta_{ref}} \left(-0.0162 \cdot \zeta - \frac{0.0059}{\zeta} + 0.9858 \right) \quad \text{where} \quad \zeta = \frac{P_{dc}}{P_{dc0}} \quad \text{and} \quad P_{dc0} = \frac{P_{ac0}}{\eta_{nom}} \quad (10)$$

When the predicted AC output exceeds the nameplate rating, the output is clipped to the nameplate value. The inverter efficiency is shown in Fig. 4 for different nominal efficiencies, along with the original version 1 curve.

$$P_{ac} = \begin{cases} \eta P_{dc} & : 0 < P_{dc} < P_{dc0} \\ P_{ac0} & : P_{dc} \geq P_{dc0} \\ 0 & : P_{dc} = 0 \end{cases} \quad (11)$$

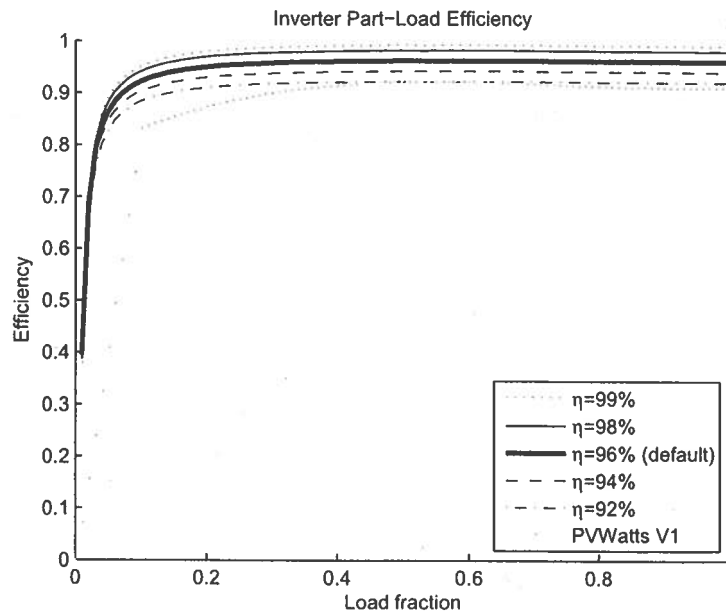


Figure 4. Inverter part-load efficiency curve

Table 7. Hourly Calculated Outputs

Field	Units
Incident POA irradiance	W/m ²
Transmitted POA irradiance	W/m ²
DC power	W
AC power	W

13 Model Outputs

PVWatts reports several hourly outputs based on the system specifications and hourly irradiance, temperature, and wind speed data. They are summarized in Table 7.

In addition, the average incident POA irradiance per day in each month is reported to the user. For each month m , the average POA in (kW/m²/day) is given by Equ. 12.

$$POA_m = \frac{0.001 \cdot \sum_m POA_h}{\text{number of days in month } m} \quad (12)$$

The hourly outputs DC and AC power are also aggregated into monthly and annual energy totals that are reported to the user.

14 Comparison with Version 1 Results

Energy predictions of PVWatts V5 were compared to PVWatts V1 for several TMY2 locations. Several scenarios were considered:

1. *Fixed*: Fixed 20 degree tilt, south facing, standard module
2. *Fixed+Premium*: Fixed 20 degree tilt, south facing, premium module in PVWatts V5
3. *1 Axis*: Self-shaded one axis tracking, GCR 0.4, standard module
4. *Backtracking*: Backtracked one axis tracking, GCR 0.4, standard module
5. *2 Axis*: Two axis tracking, standard module

The number for each scenario reported in Table 8 is the percent difference between PVWatts V5 and V1 annual AC energy production estimates. The results show that PVWatts V5 predicts on average 8 % percent more annual energy across all system configurations and locations. The one axis tracking cases show a lower increase - this is because PVWatts V1 overpredicts one axis tracking by assuming no self shading of rows. The greater relative improvement for fixed systems is due to the fact that fixed arrays operate more frequently at part-load since they do not track the sun, and so the effect of the improved part-load inverter efficiency is more pronounced.

15 Comparison with Measured Data

In this section, PVWatts predictions are shown for several systems. The nine systems considered are detailed in [23], and consist of 8 fixed tilt systems and one 1-axis tracked system. PVWatts V1 underpredicts system performance by 11.9 % when comparing annual AC energy, while PVWatts V5 is low by only 1.8 %. All of the systems considered were unshaded, and the periods during which the system was unavailable were removed from the comparison. Consequently, the loss mechanisms for shading and availability were set to zero for both models. Systems with non-standard module types were configured appropriately in PVWatts V5: system 2 (premium), system 7 (thin-film), and system 9 (thin-film).

In Figure 6, PVWatts V1 hourly results are shown for a fixed crystalline silicon system in Colorado. The data does not support the quadratic behavior at low power levels predicted by V1. PVWatts V5 does not include the module performance adjustment below 125 W/m^2 , and thus matches the measured system data better. The PVWatts V1 low irradiance assumptions are not supported by any of the modern systems considered. In addition, the updated inverter performance curve in V5 tracks the measured system output more closely at high power outputs.

16 Summary

A comprehensive update to the popular PVWatts photovoltaic performance model was presented. The improved model formulation and updated default assumptions in V5 largely correct the underprediction of V1 relative to actual system performance. The updated PVWatts will be deployed to the NREL PVWatts Online Calculator in the fall of 2014, available at <http://pvwatts.nrel.gov>.

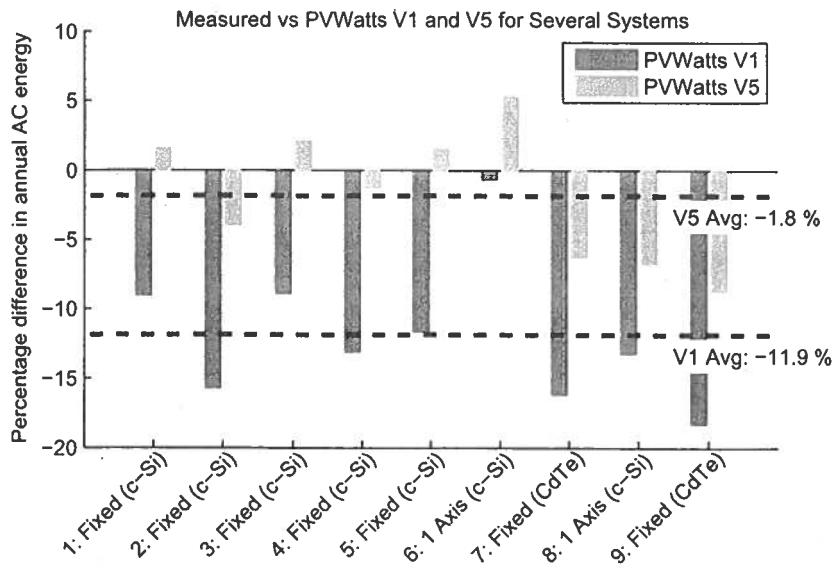


Figure 5. Comparison of PVWatts V1 and V5 AC energy prediction vs measured

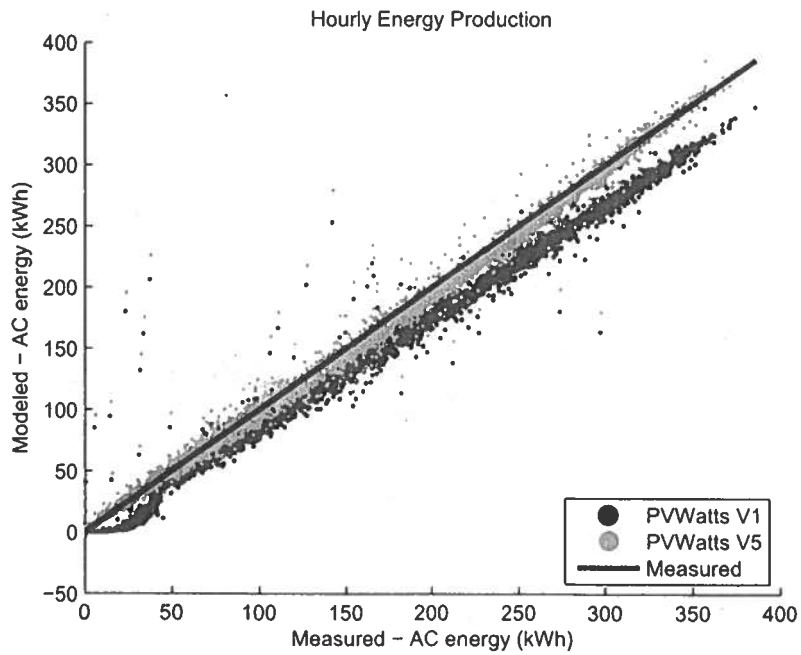


Figure 6. Hourly PVWatts V1 and V5 predictions vs measured

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Table 8. Comparison with PVWatts V1 for selected TMY2 locations

Location	Fixed	Fixed+Premium	1 Axis	Backtracking	2 Axis
AK Anchorage	14.7 %	14.3 %	6.8 %	8.0 %	9.6 %
AL Huntsville	9.7 %	11.2 %	4.9 %	5.9 %	8.5 %
AR Little Rock	9.8 %	11.5 %	4.7 %	5.6 %	8.5 %
AZ Phoenix	8.8 %	12.1 %	3.7 %	3.9 %	8.0 %
CA Sacramento	9.2 %	11.2 %	4.0 %	4.5 %	8.2 %
CO Boulder	8.9 %	10.2 %	3.3 %	3.9 %	7.3 %
CT Hartford	10.2 %	10.7 %	5.0 %	6.3 %	8.0 %
DE Wilmington	9.9 %	10.8 %	4.9 %	5.9 %	8.3 %
FL Miami	9.4 %	11.5 %	4.7 %	5.7 %	8.3 %
GA Atlanta	9.5 %	11.0 %	4.6 %	5.4 %	8.4 %
HI Honolulu	8.7 %	10.9 %	3.0 %	3.4 %	7.8 %
IA Des Moines	9.6 %	10.3 %	4.2 %	4.9 %	8.0 %
ID Boise	9.4 %	10.6 %	3.2 %	3.6 %	8.1 %
IL Chicago	10.1 %	10.7 %	4.7 %	5.7 %	8.4 %
IN Indianapolis	10.0 %	10.8 %	4.9 %	6.0 %	8.5 %
KS Wichita	9.3 %	10.4 %	4.0 %	4.6 %	8.0 %
KY Lexington	10.1 %	11.0 %	5.0 %	6.0 %	8.7 %
LA New Orleans	9.9 %	11.8 %	5.3 %	6.4 %	8.6 %
MA Boston	9.8 %	10.2 %	4.7 %	5.7 %	8.0 %
MD Baltimore	10.0 %	10.9 %	4.9 %	5.9 %	8.4 %
ME Portland	9.6 %	9.8 %	3.9 %	4.8 %	6.9 %
MI Detroit	10.5 %	10.9 %	4.9 %	6.1 %	8.2 %
MN Minneapolis	9.5 %	9.8 %	3.7 %	4.5 %	6.9 %
MO Springfield	9.6 %	10.8 %	4.4 %	5.1 %	8.3 %
MS Jackson	9.8 %	11.6 %	5.2 %	6.2 %	8.5 %
MT Great Falls	9.7 %	10.1 %	3.5 %	4.2 %	7.3 %
NC Charlotte	9.7 %	11.2 %	4.9 %	5.8 %	8.5 %
ND Fargo	9.6 %	9.6 %	3.3 %	4.1 %	6.6 %
NE Omaha	9.5 %	10.4 %	4.2 %	5.0 %	7.5 %
NH Concord	9.8 %	10.3 %	4.3 %	5.2 %	7.6 %
NJ Newark	10.2 %	10.8 %	5.3 %	6.4 %	8.6 %
NM Albuquerque	8.5 %	10.3 %	3.6 %	4.0 %	7.6 %
NV Las Vegas	8.5 %	11.2 %	3.0 %	3.1 %	7.8 %
NY Albany	10.2 %	10.6 %	4.4 %	5.4 %	8.0 %
OH Cleveland	10.8 %	11.4 %	5.3 %	6.5 %	8.6 %
OK Tulsa	9.5 %	10.8 %	4.2 %	4.9 %	8.4 %
OR Portland	11.6 %	12.6 %	5.6 %	6.6 %	9.9 %
PA Harrisburg	10.0 %	10.9 %	5.0 %	6.0 %	8.6 %
RI Providence	9.8 %	10.2 %	4.8 %	5.8 %	8.1 %
SC Charleston	9.5 %	11.1 %	4.7 %	5.5 %	8.4 %
SD Sioux Falls	9.6 %	10.1 %	3.8 %	4.5 %	7.1 %
TN Chattanooga	10.1 %	11.7 %	5.4 %	6.4 %	9.0 %
TX Abilene	8.9 %	10.6 %	3.6 %	4.1 %	7.9 %
UT Salt Lake City	9.4 %	10.9 %	3.6 %	4.1 %	7.8 %
VA Richmond	9.8 %	10.9 %	4.8 %	5.7 %	8.4 %
VT Burlington	10.1 %	10.3 %	4.1 %	5.1 %	7.4 %
WA Yakima	9.8 %	11.2 %	3.3 %	3.7 %	8.1 %
WI Madison	9.9 %	10.2 %	4.6 %	5.7 %	7.8 %
WV Elkins	10.7 %	11.3 %	5.9 %	7.4 %	9.0 %
WY Cheyenne	8.8 %	9.2 %	2.9 %	3.4 %	7.2 %
Average	9.8 %	10.9 %	4.4 %	5.3 %	8.1 %



Rate Class	Date	Hour	Usage	AVG CUST
KY_RS	04/01/2021	1	135,993.04	1.01279
KY_RS	04/01/2021	2	131,457.15	0.97901
KY_RS	04/01/2021	3	131,052.57	0.976
KY_RS	04/01/2021	4	132,981.63	0.99036
KY_RS	04/01/2021	5	138,226.42	1.02942
KY_RS	04/01/2021	6	150,835.84	1.12333
KY_RS	04/01/2021	7	170,259.05	1.26798
KY_RS	04/01/2021	8	183,544.92	1.36693
KY_RS	04/01/2021	9	181,501.05	1.35171
KY_RS	04/01/2021	10	170,198.30	1.26753
KY_RS	04/01/2021	11	167,930.04	1.25064
KY_RS	04/01/2021	12	173,201.76	1.2899
KY_RS	04/01/2021	13	167,211.62	1.24529
KY_RS	04/01/2021	14	167,391.96	1.24663
KY_RS	04/01/2021	15	168,045.08	1.25149
KY_RS	04/01/2021	16	174,365.73	1.29857
KY_RS	04/01/2021	17	184,482.12	1.37391
KY_RS	04/01/2021	18	196,639.57	1.46445
KY_RS	04/01/2021	19	204,183.44	1.52063
KY_RS	04/01/2021	20	209,092.60	1.55719
KY_RS	04/01/2021	21	214,742.32	1.59927
KY_RS	04/01/2021	22	208,381.41	1.55189
KY_RS	04/01/2021	23	192,351.14	1.43251
KY_RS	04/01/2021	24	177,498.10	1.3219
KY_RS	04/02/2021	1	166,703.54	1.2415
KY_RS	04/02/2021	2	162,672.12	1.21148
KY_RS	04/02/2021	3	162,181.85	1.20783
KY_RS	04/02/2021	4	164,025.24	1.22156
KY_RS	04/02/2021	5	169,481.47	1.26219
KY_RS	04/02/2021	6	180,821.47	1.34665
KY_RS	04/02/2021	7	198,133.54	1.47557
KY_RS	04/02/2021	8	211,747.90	1.57697
KY_RS	04/02/2021	9	204,058.05	1.5197
KY_RS	04/02/2021	10	189,849.09	1.41388
KY_RS	04/02/2021	11	176,940.54	1.31774
KY_RS	04/02/2021	12	166,750.82	1.24186
KY_RS	04/02/2021	13	159,198.29	1.18561
KY_RS	04/02/2021	14	150,876.17	1.12363
KY_RS	04/02/2021	15	142,864.76	1.06397
KY_RS	04/02/2021	16	137,936.76	1.02727
KY_RS	04/02/2021	17	137,828.65	1.02646
KY_RS	04/02/2021	18	140,604.00	1.04713
KY_RS	04/02/2021	19	141,336.72	1.05259
KY_RS	04/02/2021	20	146,592.24	1.09173
KY_RS	04/02/2021	21	159,738.24	1.18963
KY_RS	04/02/2021	22	165,532.17	1.23278
KY_RS	04/02/2021	23	161,756.79	1.20466

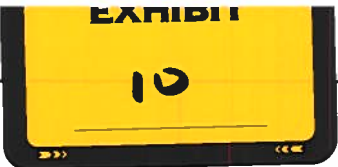


Rate Class	Date	Hour	Usage	AVG CUST
KY_RS	05/23/2021	22	259,862.46	1.93529
KY_RS	05/23/2021	23	235,654.96	1.75501
KY_RS	05/23/2021	24	202,303.60	1.50663
KY_RS	05/24/2021	1	173,746.31	1.29395
KY_RS	05/24/2021	2	152,400.42	1.13498
KY_RS	05/24/2021	3	136,206.89	1.01438
KY_RS	05/24/2021	4	124,885.26	0.93007
KY_RS	05/24/2021	5	118,120.29	0.87969
KY_RS	05/24/2021	6	118,646.55	0.88361
KY_RS	05/24/2021	7	128,473.35	0.95679
KY_RS	05/24/2021	8	138,080.14	1.02833
KY_RS	05/24/2021	9	139,562.89	1.03938
KY_RS	05/24/2021	10	151,592.62	1.12897
KY_RS	05/24/2021	11	180,379.69	1.34336
KY_RS	05/24/2021	12	204,380.72	1.5221
KY_RS	05/24/2021	13	226,906.44	1.68986
KY_RS	05/24/2021	14	238,435.03	1.77572
KY_RS	05/24/2021	15	250,243.15	1.86365
KY_RS	05/24/2021	16	268,736.28	2.00138
KY_RS	05/24/2021	17	291,122.16	2.1681
KY_RS	05/24/2021	18	311,441.41	2.31942
KY_RS	05/24/2021	19	317,323.25	2.36323
KY_RS	05/24/2021	20	303,360.35	2.25924
KY_RS	05/24/2021	21	289,129.91	2.15326
KY_RS	05/24/2021	22	275,096.99	2.04875
KY_RS	05/24/2021	23	247,200.85	1.841
KY_RS	05/24/2021	24	209,373.65	1.55928
KY_RS	05/25/2021	1	177,470.99	1.32169
KY_RS	05/25/2021	2	154,635.05	1.15163
KY_RS	05/25/2021	3	138,001.44	1.02775
KY_RS	05/25/2021	4	126,339.46	0.9409
KY_RS	05/25/2021	5	119,266.06	0.88822
KY_RS	05/25/2021	6	119,004.93	0.88627
KY_RS	05/25/2021	7	128,523.02	0.95716
KY_RS	05/25/2021	8	139,756.45	1.04082
KY_RS	05/25/2021	9	150,264.89	1.11908
KY_RS	05/25/2021	10	165,289.33	1.23097
KY_RS	05/25/2021	11	188,794.31	1.40602
KY_RS	05/25/2021	12	211,109.12	1.57221
KY_RS	05/25/2021	13	229,526.38	1.70937
KY_RS	05/25/2021	14	244,485.65	1.82078
KY_RS	05/25/2021	15	257,477.25	1.91753
KY_RS	05/25/2021	16	274,530.54	2.04453
KY_RS	05/25/2021	17	289,855.97	2.15867
KY_RS	05/25/2021	18	297,333.81	2.21436
KY_RS	05/25/2021	19	303,510.96	2.26036
KY_RS	05/25/2021	20	297,935.18	2.21884

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Rate Class	Date	Hour	AVGCUST_PRESOLAR	PV Watts 7.0815 kwDC	Pre Solar less Solar output (all values)	AVGCUST_POSTSOLAR (Import Only)	blan k1	blan k2	blan k3	Export	System Peak Hour used in COSS Pre-Solar	System Peak Hour used in COSS Post-Solar	Month
664	KY_RS	04/28/2021	15	1.0992	0.6035	0.4957	0.4957				0.0000	1.0992	0.4957	4
1290	KY_RS	05/24/2021	17	2.1681	0.6463	1.5218	1.5218				0.0000	2.1681	1.5218	5
2153	KY_RS	06/29/2021	16	2.5416	3.9175	(1.3759)	0.0000				(1.3759)	2.5416	0.0000	6
2322	KY_RS	07/06/2021	17	2.5217	2.2111	0.3106	0.3106				0.0000	2.5217	0.3106	7
3209	KY_RS	08/12/2021	16	2.6160	1.3538	1.2622	1.2622				0.0000	2.6160	1.2622	8
4002	KY_RS	09/14/2021	17	2.2575	1.7180	0.5395	0.5395				0.0000	2.2575	0.5395	9
4650	KY_RS	10/11/2021	17	1.7266	0.5760	1.1506	1.1506				0.0000	1.7266	1.1506	10
5673	KY_RS	11/23/2021	8	1.7238	0.0000	1.7238	1.7238				0.0000	1.7238	1.7238	11
6019	KY_RS	12/07/2021	18	1.8744	0.0000	1.8744	1.8744				0.0000	1.8744	1.8744	12
7209	KY_RS	01/26/2022	8	2.3854	0.0000	2.3854	2.3854				0.0000	2.3854	2.3854	1
7521	KY_RS	02/08/2022	8	2.0526	0.0000	2.0526	2.0526				0.0000	2.0526	2.0526	2
8301	KY_RS	03/12/2022	20	1.8896	0.0000	1.8896	1.8896				0.0000	1.8896	1.8896	3
8762				11,052.0003	8,841.8878	2,210.1125	6,929.7647				(4,719.6522)	24.8565	15.2062	



KYSEIA
HEARING EXHIBIT 9



Month	Day	Hour	Beam Irradiance (W/m ²)	Diffuse Irradiance (W/m ²)	Ambient Temperature (C)	Wind Speed (m/s)	Albedo	Plane of Array Irradiance (W/m ²)	Cell Temperature (C)	DC Array Output (W)	AC System Output (W)	AC System Output (kW)
5	22	12	190	481	19	0.2	0.13	680.609	49.019	3644.69	3487.476	3.487476
5	22	13	225	463	20	0.2	0.13	690.108	50.455	3681.009	3522.508	3.522508
5	22	14	237	417	20	0.1	0.13	631.237	48.806	3402.246	3253.623	3.253623
5	22	15	826	133	20	0.1	0.13	767.197	55.196	4104.755	3931.239	3.931239
5	22	16	564	171	19	0.1	0.13	498.015	41.882	2824.648	2696.491	2.696491
5	22	17	675	95	19	0.1	0.13	340.065	34.474	1902.902	1807.407	1.807407
5	22	18	496	66	17	0.3	0.13	126.966	22.09	590.645	541.648	0.541648
5	22	19	0	24	14	0.5	0.13	21.52	14.753	78.938	48.073	0.048073
5	22	20	0	0	12	0.4	0.13	0	12	0	0	0
5	22	21	0	0	12	0.4	0.13	0	12	0	0	0
5	22	22	0	0	11	0.4	0.13	0	11	0	0	0
5	22	23	0	0	11	0.4	0.13	0	11	0	0	0
5	23	0	0	0	11	0.5	0.13	0	11	0	0	0
5	23	1	0	0	10	0.5	0.13	0	10	0	0	0
5	23	2	0	0	10	0.6	0.13	0	10	0	0	0
5	23	3	0	0	9	0.5	0.13	0	9	0	0	0
5	23	4	0	0	9	0.3	0.13	0	9	0	0	0
5	23	5	0	10	10	0.1	0.13	9.698	10.384	35.032	5.723	0.005723
5	23	6	385	66	12	0.2	0.13	95.578	15.954	451.17	407.115	0.407115
5	23	7	645	94	14	0.2	0.13	304.245	27.34	1717.316	1628.396	1.628396
5	23	8	756	114	17	0.3	0.13	529.386	39.854	3045.934	2909.936	2.909936
5	23	9	822	128	18	0.3	0.13	737.051	49.737	4041.559	3870.283	3.870283
5	23	10	865	133	20	0.2	0.13	896.951	59.784	4676.799	4483.013	4.483013
5	23	11	883	138	22	0.2	0.13	1000.014	66.309	5038.673	4832.065	4.832065
5	23	12	879	143	23	0.2	0.13	1031.786	68.699	5132.419	4922.489	4.922489
5	23	13	432	391	24	0.2	0.13	833.411	60.83	4271.43	4092.009	4.092009
5	23	14	319	399	24	0.2	0.13	692.894	54.63	3652.293	3494.809	3.494809
5	23	15	322	331	23	0.2	0.13	576.952	48.553	3137.607	2998.361	2.998361
5	23	16	264	258	23	0.2	0.13	406.512	41.047	2287.28	2178.164	2.178164
5	23	17	174	175	22	0.2	0.13	229.647	32.171	1307.108	1232.724	1.232724
5	23	18	104	93	19	0.1	0.13	98.446	23.448	538.12	490.984	0.490984
5	23	19	0	15	17	0.1	0.13	14.189	17.561	50.313	20.462	0.020462
5	23	20	0	0	17	0.2	0.13	0	17	0	0	0
5	23	21	0	0	16	0.2	0.13	0	16	0	0	0
5	23	22	0	0	16	0.2	0.13	0	16	0	0	0
5	23	23	0	0	16	0.2	0.13	0	16	0	0	0
5	24	0	0	0	15	0.2	0.13	0	15	0	0	0
5	24	1	0	0	15	0.1	0.13	0	15	0	0	0
5	24	2	0	0	14	0.1	0.13	0	14	0	0	0
5	24	3	0	0	14	0.1	0.13	0	14	0	0	0
5	24	4	0	0	14	0.1	0.13	0	14	0	0	0
5	24	5	0	6	14	0.1	0.13	5.819	14.23	20.095	0	0
5	24	6	80	78	16	0.2	0.13	77.842	19.405	428.653	385.396	0.385396

KYSEIA
 HEARING EXHIBIT 10

Month	Day	Hour	Beam Irradiance (W/m2)	Diffuse Irradiance (W/m2)	Ambient Temperature (C)	Wind Speed (m/s)	Albedo	Plane of Array Irradiance (W/m2)	Cell Temperature (C)	DC Array Output (W)	AC System Output (W)	AC System Output (kW)
5	24	7	86	160	18	0.3	0.13	178.652	25.673	1037.869	973.026	0.973026
5	24	8	63	241	19	0.3	0.13	265.552	30.411	1535.961	1453.468	1.453468
5	24	9	16	246	19	0.3	0.13	247.005	29.577	1411.782	1333.689	1.333689
5	24	10	23	312	19	0.3	0.13	320.537	32.7	1810.481	1718.261	1.718261
5	24	11	16	291	19	0.3	0.13	295.994	31.635	1667.952	1580.782	1.580782
5	24	12	5	156	19	0.4	0.13	154.375	25.389	871.42	812.474	0.812474
5	24	13	55	425	19	0.5	0.13	476.489	38.165	2647.865	2525.973	2.525973
5	24	14	11	225	19	0.5	0.13	225.53	28.075	1282.496	1208.984	1.208984
5	24	15	0	78	19	0.6	0.13	74.085	21.901	416.436	373.612	0.373612
5	24	16	0	128	19	0.6	0.13	121.584	23.775	699.141	646.3	0.6463
5	24	17	0	6	18	0.5	0.13	5.671	18.23	29.356	0.248	0.000248
5	24	18	0	3	17	0.4	0.13	2.831	17.118	14.249	0	0
5	24	19	0	0	15	0.4	0.13	0	0	0	0	0
5	24	20	0	0	13	0.3	0.13	0	13	0	0	0
5	24	21	0	0	13	0.3	0.13	0	13	0	0	0
5	24	22	0	0	13	0.3	0.13	0	13	0	0	0
5	24	23	0	0	13	0.3	0.13	0	13	0	0	0
5	25	0	0	0	13	0.3	0.13	0	13	0	0	0
5	25	1	0	0	13	0.4	0.13	0	13	0	0	0
5	25	2	0	0	13	0.3	0.13	0	13	0	0	0
5	25	3	0	0	13	0.3	0.13	0	13	0	0	0
5	25	4	0	0	13	0.4	0.13	0	13	0	0	0
5	25	5	0	1	13	0.4	0.13	0.97	13.035	0	0	0
5	25	6	0	30	13	0.4	0.13	28.37	14.184	161.584	127.791	0.127791
5	25	7	0	53	14	0.4	0.13	50.192	16.097	291.787	253.38	0.25338
5	25	8	0	65	16	0.4	0.13	61.633	18.567	353.036	312.458	0.312458
5	25	9	100	337	17	0.4	0.13	401.53	33.695	2295.128	2185.735	2.185735
5	25	10	145	417	18	0.5	0.13	544.976	39.966	3035.819	2900.18	2.90018
5	25	11	13	252	19	0.6	0.13	254.928	28.96	1445.57	1366.279	1.366279
5	25	12	11	222	19	0.6	0.13	224.39	27.763	1271.524	1198.4	1.1984
5	25	13	25	355	20	0.7	0.13	375.954	34.285	2108.978	2006.18	2.00618
5	25	14	29	340	20	0.6	0.13	360.544	34.101	2029.726	1929.737	1.929737
5	25	15	0	146	19	0.6	0.13	139.071	24.446	793.32	737.142	0.737142
5	25	16	0	93	19	0.5	0.13	88.275	22.567	503.579	457.667	0.457667
5	25	17	0	16	18	0.5	0.13	15.129	18.613	82.112	51.135	0.051135
5	25	18	393	79	17	0.4	0.13	125.353	21.962	614.093	564.265	0.564265
5	25	19	85	21	15	0.3	0.13	17.563	15.652	63.492	33.175	0.033175
5	25	20	0	0	15	0.3	0.13	0	15	0	0	0
5	25	21	0	0	14	0.2	0.13	0	14	0	0	0
5	25	22	0	0	14	0.2	0.13	0	14	0	0	0
5	25	23	0	0	14	0.2	0.13	0	14	0	0	0
5	26	0	0	0	14	0.2	0.13	0	14	0	0	0
5	26	1	0	0	13	0.2	0.13	0	13	0	0	0

KY_RS	06/27/2021	16	2.3888	1.7757	0.6131	0.6131	0.0000	6
KY_RS	06/27/2021	17	2.4594	1.9489	0.5105	0.5105	0.0000	6
KY_RS	06/27/2021	18	2.5399	1.4887	1.0512	1.0512	0.0000	6
KY_RS	06/27/2021	19	2.5684	0.6197	1.9487	1.9487	0.0000	6
KY_RS	06/27/2021	20	2.5426	0.1107	2.4320	2.4320	0.0000	6
KY_RS	06/27/2021	21	2.4529	0.0000	2.4529	2.4529	0.0000	6
KY_RS	06/27/2021	22	2.3279	0.0000	2.3279	2.3279	0.0000	6
KY_RS	06/27/2021	23	2.1602	0.0000	2.1602	2.1602	0.0000	6
KY_RS	06/27/2021	24	1.8983	0.0000	1.8983	1.8983	0.0000	6
KY_RS	06/28/2021	1	1.6585	0.0000	1.6585	1.6585	0.0000	6
KY_RS	06/28/2021	2	1.4665	0.0000	1.4665	1.4665	0.0000	6
KY_RS	06/28/2021	3	1.3257	0.0000	1.3257	1.3257	0.0000	6
KY_RS	06/28/2021	4	1.2213	0.0000	1.2213	1.2213	0.0000	6
KY_RS	06/28/2021	5	1.1475	0.0000	1.1475	1.1475	0.0000	6
KY_RS	06/28/2021	6	1.1174	0.0000	1.1174	1.1174	0.0000	6
KY_RS	06/28/2021	7	1.1362	0.3422	0.7940	0.7940	0.0000	6
KY_RS	06/28/2021	8	1.2353	1.0477	0.1876	0.1876	0.0000	6
KY_RS	06/28/2021	9	1.3945	2.1338	(0.7393)	0.0000	(0.7393)	6
KY_RS	06/28/2021	10	1.6004	3.5285	(1.9281)	0.0000	(1.9281)	6
KY_RS	06/28/2021	11	1.8170	4.2568	(2.4398)	0.0000	(2.4398)	6
KY_RS	06/28/2021	12	2.0012	4.0435	(2.0423)	0.0000	(2.0423)	6
KY_RS	06/28/2021	13	2.1199	4.3854	(2.2655)	0.0000	(2.2655)	6
KY_RS	06/28/2021	14	2.1262	4.0625	(1.9364)	0.0000	(1.9364)	6
KY_RS	06/28/2021	15	2.1094	3.9030	(1.7936)	0.0000	(1.7936)	6
KY_RS	06/28/2021	16	2.2662	3.9496	(1.6834)	0.0000	(1.6834)	6
KY_RS	06/28/2021	17	2.4448	3.1200	(0.6753)	0.0000	(0.6753)	6
KY_RS	06/28/2021	18	2.5929	1.9795	0.6134	0.6134	0.0000	6
KY_RS	06/28/2021	19	2.6607	0.6988	1.9619	1.9619	0.0000	6
KY_RS	06/28/2021	20	2.6370	0.0805	2.5565	2.5565	0.0000	6
KY_RS	06/28/2021	21	2.5271	0.0000	2.5271	2.5271	0.0000	6
KY_RS	06/28/2021	22	2.4009	0.0000	2.4009	2.4009	0.0000	6
KY_RS	06/28/2021	23	2.2256	0.0000	2.2256	2.2256	0.0000	6
KY_RS	06/28/2021	24	1.9742	0.0000	1.9742	1.9742	0.0000	6
KY_RS	06/29/2021	1	1.7462	0.0000	1.7462	1.7462	0.0000	6
KY_RS	06/29/2021	2	1.5638	0.0000	1.5638	1.5638	0.0000	6
KY_RS	06/29/2021	3	1.4209	0.0000	1.4209	1.4209	0.0000	6
KY_RS	06/29/2021	4	1.3141	0.0000	1.3141	1.3141	0.0000	6
KY_RS	06/29/2021	5	1.2436	0.0000	1.2436	1.2436	0.0000	6
KY_RS	06/29/2021	6	1.2098	0.0120	1.1978	1.1978	0.0000	6
KY_RS	06/29/2021	7	1.2210	0.3114	0.9095	0.9095	0.0000	6
KY_RS	06/29/2021	8	1.3217	1.5479	(0.2162)	0.0000	(0.2162)	6
KY_RS	06/29/2021	9	1.4872	2.8522	(1.3650)	0.0000	(1.3650)	6
KY_RS	06/29/2021	10	1.6972	3.7656	(2.0684)	0.0000	(2.0684)	6
KY_RS	06/29/2021	11	1.9102	4.4199	(2.5097)	0.0000	(2.5097)	6
KY_RS	06/29/2021	12	2.0970	4.8093	(2.7123)	0.0000	(2.7123)	6
KY_RS	06/29/2021	13	2.2421	4.9435	(2.7014)	0.0000	(2.7014)	6
KY_RS	06/29/2021	14	2.3500	4.8552	(2.5052)	0.0000	(2.5052)	6
KY_RS	06/29/2021	15	2.4371	4.4977	(2.0607)	0.0000	(2.0607)	6
KY_RS	06/29/2021	16	2.5416	3.9175	(1.3759)	0.0000	(1.3759)	6
KY_RS	06/29/2021	17	2.6604	3.0869	(0.4265)	0.0000	(0.4265)	6
KY_RS	06/29/2021	18	2.7481	1.9479	0.8002	0.8002	0.0000	6
KY_RS	06/29/2021	19	2.6155	0.6985	1.9169	1.9169	0.0000	6
KY_RS	06/29/2021	20	2.4453	0.0941	2.3512	2.3512	0.0000	6
KY_RS	06/29/2021	21	2.3402	0.0000	2.3402	2.3402	0.0000	6
KY_RS	06/29/2021	22	2.2349	0.0000	2.2349	2.2349	0.0000	6
KY_RS	06/29/2021	23	2.0689	0.0000	2.0689	2.0689	0.0000	6
KY_RS	06/29/2021	24	1.8454	0.0000	1.8454	1.8454	0.0000	6
KY_RS	06/30/2021	1	1.6554	0.0000	1.6554	1.6554	0.0000	6
KY_RS	06/30/2021	2	1.4939	0.0000	1.4939	1.4939	0.0000	6
KY_RS	06/30/2021	3	1.3713	0.0000	1.3713	1.3713	0.0000	6
KY_RS	06/30/2021	4	1.2772	0.0000	1.2772	1.2772	0.0000	6
KY_RS	06/30/2021	5	1.2148	0.0000	1.2148	1.2148	0.0000	6
KY_RS	06/30/2021	6	1.1943	0.0080	1.1863	1.1863	0.0000	6
KY_RS	06/30/2021	7	1.2122	0.3337	0.8785	0.8785	0.0000	6
KY_RS	06/30/2021	8	1.2696	1.4588	(0.1892)	0.0000	(0.1892)	6
KY_RS	06/30/2021	9	1.4014	2.6738	(1.2724)	0.0000	(1.2724)	6
KY_RS	06/30/2021	10	1.4310	3.5535	(2.1225)	0.0000	(2.1225)	6
KY_RS	06/30/2021	11	1.4584	4.1780	(2.7197)	0.0000	(2.7197)	6
KY_RS	06/30/2021	12	1.5840	4.5513	(2.9674)	0.0000	(2.9674)	6
KY_RS	06/30/2021	13	1.7538	4.6748	(2.9211)	0.0000	(2.9211)	6
KY_RS	06/30/2021	14	1.8662	4.5838	(2.7176)	0.0000	(2.7176)	6
KY_RS	06/30/2021	15	2.0119	4.2663	(2.2544)	0.0000	(2.2544)	6
KY_RS	06/30/2021	16	2.1189	3.7219	(1.6029)	0.0000	(1.6029)	6
KY_RS	06/30/2021	17	2.2135	2.9230	(0.7094)	0.0000	(0.7094)	6
KY_RS	06/30/2021	18	2.2630	1.8618	0.4012	0.4012	0.0000	6
KY_RS	06/30/2021	19	2.2635	0.6959	1.5675	1.5675	0.0000	6
KY_RS	06/30/2021	20	2.1431	0.1157	2.0273	2.0273	0.0000	6
KY_RS	06/30/2021	21	2.0273	0.0000	2.0273	2.0273	0.0000	6
KY_RS	06/30/2021	22	1.9423	0.0000	1.9423	1.9423	0.0000	6
KY_RS	06/30/2021	23	1.7398	0.0000	1.7398	1.7398	0.0000	6
KY_RS	06/30/2021	24	1.5060	0.0000	1.5060	1.5060	0.0000	6



2.5416 0.0000

**KYSEIA
HEARING EXHIBIT 11**

KY_RS	06/29/2021	12	2.0970	4.8093	(2.7123)	0.0000	(2.7123)			6
KY_RS	06/29/2021	13	2.2421	4.9435	(2.7014)	0.0000	(2.7014)			6
KY_RS	06/29/2021	14	2.3500	4.8552	(2.5052)	0.0000	(2.5052)			6
KY_RS	06/29/2021	15	2.4371	4.4977	(2.0607)	0.0000	(2.0607)			6
KY_RS	06/29/2021	16	2.5416	3.9175	(1.3759)	0.0000	(1.3759)	2.5416	0.0000	6
KY_RS	06/29/2021	17	2.6604	3.0869	(0.4265)	0.0000	(0.4265)			6
KY_RS	06/29/2021	18	2.7481	1.9479	0.8002	0.8002	0.0000			6
KY_RS	06/29/2021	19	2.6155	0.6985	1.9169	1.9169	0.0000			6
KY_RS	06/29/2021	20	2.4453	0.0941	2.3512	2.3512	0.0000			6
KY_RS	06/29/2021	21	2.3402	0.0000	2.3402	2.3402	0.0000			6
KY_RS	06/29/2021	22	2.2349	0.0000	2.2349	2.2349	0.0000			6
KY_RS	06/29/2021	23	2.0689	0.0000	2.0689	2.0689	0.0000			6
KY_RS	06/29/2021	24	1.8454	0.0000	1.8454	1.8454	0.0000			6

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