

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

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IN THE MATTER OF THE COMPLAINT OF
ENERGY OF UTAH, LLC AND FALL RIVER
SOLAR, LLC AGAINST BLACK HILLS
POWER, INC.

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Docket No. EL18-038

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REBUTTAL TESTIMONY
OF MARK KLEIN

On Behalf of
ENERGY OF UTAH, LLC
AND
FALL RIVER SOLAR, LLC

JANUARY 30, 2020

1 Q: State your name for the record, please.

2 A: My name is Mark Klein. I provided written expert testimony in February of 2019 in this
3 case. My qualifications to provide expert testimony in this case haven't changed since
4 my initial testimony was filed.

5 Q: Have you read and reviewed the testimony filed by Black Hills witnesses Kyle White,
6 Amanda Thames, and James McMahon and by Commission staff witness Darren
7 Kearney?

8 A: Yes, and I read and reviewed the depositions of Ros Vrba, Mr. White, Ms. Thames, and
9 Black Hills employee Justin Briggs, along with the exhibits to the depositions. I also
10 read and reviewed the responses to discovery requests of the parties, in order to follow
11 developments in the case and in anticipation of preparing this testimony.

12 Q: For what purpose do you offer this testimony?

13 A: This testimony is offered in rebuttal of the testimony of Black Hills witnesses who charge
14 that Black Hill's calculation of avoided cost in this case is correct. As pointed out in this
15 testimony, I believe that my calculation of avoided cost using the proposed SD Sun
16 project was and remains correct under certain circumstances, that Black Hills calculation
17 of avoided cost is inaccurate and flawed. I also believe that if the SD Sun project is not
18 going to be constructed, the avoided cost approach proposed by Commission staff analyst
19 Darren Kearney, with certain modifications, is a more appropriate method of calculating
20 avoided cost.

21 Q: Since you filed your initial testimony in February, 2019, have there been any changes in
22 this case that affect your initial opinions?

1 A: Yes, in March of 2019 Black Hills advised that it no longer intended to construct any of
2 the three South Dakota Sun solar generating facilities. Black Hills then proposed a new
3 avoided cost.

4 Q: Please review Black Hills changes in plans with respect to the South Dakota Sun facilities
5 and how that has affected avoided cost calculations.

6 A: In 2015, SD Sun asked Black Hills for an indication of avoided cost for a proposed 20
7 megawatt photo-voltaic solar generator in Fall River County, about 20 miles away from
8 Fall River's planned facility. Black Hills calculated an avoided cost rate for the project,
9 and the parties entered into a power purchase agreement in 2016. Per the agreement,
10 Black Hills agreed to purchase SD Sun's energy and capacity for \$44.54 per megawatt
11 hour for 20 years. Shortly after SD Sun and Black Hills entered into the power purchase
12 agreement, SD Sun II announced it would construct a 20-megawatt facility at the same
13 location. In early 2017, SD Sun II negotiated an avoided cost rate with Black Hills of
14 approximately \$41.66 per megawatt hour and the parties entered into a second power
15 purchase agreement. About the same time, the owner of the SD Sun projects began
16 developing a third 12-megawatt project.

17 Black Hills purchased the three solar projects in early 2018. About the same time,
18 Fall River announced its planned project and requested an indication of avoided cost
19 from Black Hills. In the spring of 2018, Black Hills said that avoided cost would be
20 \$17.06 per megawatt hour. Black Hills included the three South Dakota Sun facilities,
21 totaling 52 megawatts, in its generation fleet in its early calculation of avoided cost,
22 asserting that the South Dakota Sun projects would be operational in 2019. Fall River
23 rejected Black Hills' indication of avoided cost. Fall River believed that an accurate

1 estimate of avoided cost was the rate established in a 2017 power purchase agreement
2 between Black Hills and SD Sun II, approximately \$41.66 per megawatt hour for 20
3 years.

4 Following discussions with Fall River, in late August 2018 Black Hills told Fall
5 River that it was only going to build a 20 megawatt generator at the South Dakota Sun
6 location, not 52 megawatts. Black Hills said that the change in its generation fleet
7 resulted in an increase in avoided cost to \$21.77. Fall River rejected Black Hills' avoided
8 cost rate and again proposed the SD Sun II rate, which Black Hills rejected. Shortly
9 afterwards, in early September 2018, Fall River petitioned the Commission to set the
10 avoided cost rate and this case ensued.

11 I filed expert testimony in this case in February of 2019. I testified that Black
12 Hills expressed intention to construct the 20 megawatt SD Sun generator indicated its
13 need for energy and capacity. In my opinion, the cost of constructing and operating the
14 SD Sun facility was a relevant and appropriate method for the measurement of avoided
15 cost. I estimated the cost of construction and operation of the facility and calculated its
16 capacity value, arriving at the conclusion that Black Hills levelized avoided cost would
17 be \$48.76 per megawatt hour, using SD Sun as the proxy for Black Hills' next generator.

18 In March of 2019, not long after my testimony was filed, Black Hills announced
19 that it would not be building the 20 megawatt SD Sun facility. Black Hills published a
20 new avoided cost of \$24.95 per megawatt hour. In June, 2019 Black Hills updated its
21 calculation to \$28.30 per megawatt hour after including an inflation factor of 1.5% and
22 changing the levelization discount rate to 7.41%. That is the most recent avoided cost
23 pricing Black Hills has provided.

1 Q: Does Black Hills' withdrawal of the SD Sun generator affect your opinion regarding
2 avoided cost?

3 A: Yes and no. If the Commission decides that a legally enforceable obligation was reached
4 in September of 2018 and determines that for purposes of calculating avoided cost SD
5 Sun should be included in Black Hills' generating fleet, then I believe my avoided cost
6 calculation using SD Sun I as the proxy is accurate. On the other hand, if the
7 Commission determines that Black Hills is allowed to change its plans after the legally
8 enforceable obligation is incurred, then my opinion that SD Sun is an appropriate proxy
9 would change.

10 Q: How would your opinion change?

11 A: I would agree with Commission staff analyst Darren Kearney that a simple cycle natural
12 gas fired peaking generator would be the most likely next generation facility that Black
13 Hills would build or acquire. Accordingly, a simple cycle gas generator is an appropriate
14 proxy to be used in calculating avoided cost.

15 Q: You testified that you reviewed Mr. Kearney's pre-filed testimony. How did Mr.
16 Kearney calculate Black Hills avoided cost?

17 A: Mr. Kearney used Black Hills' forecasts as to future demand and energy costs and used
18 the estimated cost of a simple cycle natural gas fired peaking generator as the proxy for
19 calculating avoided cost. He concluded that Black Hills' estimated levelized avoided
20 cost for the Fall River project was \$34.30 per megawatt hour.

21 Q: Did Mr. Kearney qualify his use of Black Hills inputs in any way?

22 A: Mr. Kearney qualified his testimony regarding the method Black Hills employed to
23 forecast load growth and the inflation rate Black Hills used.

1 Q: How did Mr. Kearney qualify his testimony regarding Black Hills' forecast of load
2 growth?

3 A: He expressed concern that Black Hills forecast a slight negative load growth during the
4 twenty-year contract. Black Hills had historically used a look-back approach but for
5 purposes of this proceeding shifted to a weather-normalized econometric forecast to
6 determine load growth.

7 Q: Does use of a weather-normalized econometric forecast concern you?

8 A: Like Mr. Kearney, before I can say the approach is acceptable, I would like to see the
9 testimony Mr. Kearney requested from Black Hills explaining the method employed.
10 Accordingly, I reserve comment on the accuracy of the Black Hills forecast of slightly
11 negative energy growth.

12 Q: Has Black Hills made any recent forecasts of its energy growth expectations?

13 A: In its 2011 Integrated Resource Plan, Black Hills forecast energy growth at about 1% per
14 annum. In its 2018 Energy Facility Plan, it forecast flat energy growth but didn't explain
15 why in any detail.

16 Q: What do you believe to be a more appropriate rate for energy growth?

17 A: In my opinion, absent further credible explanation, energy growth will probably be more
18 in line with the 2011 Integrated Resource plan at about 1% per annum.

19 Q: What effect would that rate of energy growth have on Mr. Kearney's calculation of
20 levelized avoided cost?

21 A: It would increase Mr. Kearney's levelized avoided cost by approximately \$.23 per
22 megawatt hour.

23 Q: How did Mr. Kearney qualify his testimony with respect to inflation?

1 A: Black Hills assumed an annual rate of inflation of 1.5% in its calculations. Mr. Kearney
2 adopted that rate of inflation in his calculation but observed that it was probably low for
3 natural gas and purchased power forecasts. Mr. Kearney examined Midcontinent
4 Independent Systems Operator (MISO) inflation rates and the United States Energy
5 Information Administration (EIA) inflation forecasts. The MISO inflation forecast was
6 2.5% and Mr. Kearney determined that the EIA forecast was 2.4%.

7 Q: What is your opinion on an appropriate rate of inflation?

8 A: Black Hills witnesses testified in discovery that the 1.5% rate was based on a ten-year
9 look-back approach. In my opinion, a ten-year look back is inappropriate. The
10 Commission has held that twenty years is the appropriate term for a power purchase
11 agreement between Fall River and Black Hills, and Fall River proposed a twenty-year
12 contract when the LEO was formed in August-September of 2018. At a minimum, an
13 inflation forecast should match the life of the contract.

14 Ten years antecedent to 2018 takes into account the Great Recession of 2008-
15 2009 and because of the shortened period, places a heavier than appropriate emphasis on
16 2008 and 2009. 2008 is one of only two years since the 1930s in which the United States
17 is thought to have experienced no inflation. Consumer goods price inflation from 1998 to
18 2018 is generally thought to be about 2.2% as opposed to approximately 1.5% between
19 2008 and 2018.

20 The rate of inflation for energy from 1998 to 2018 was approximately 3.9% as
21 opposed to flat inflation between 2008 and 2018.

22 Long range economic forecasts predict general price inflation in the United States
23 to be higher than 2.1% for the period 2018-2038.

1 Comparing the MISO, EIA and general price forward looking inflation estimates
2 to a twenty-year historical perspective for energy and general price inflation, 1.5% as an
3 inflation factor is low. In my opinion, a proper rate of inflation, taking into account the
4 MISO, EIA, and general forward looking forecasts is 2.45%.

5 Q: What effect would an inflation rate of 2.45% have on Mr. Kearney's avoided cost
6 calculation?

7 A: It would increase the levelized avoided cost rate approximately \$.67 per megawatt hour.

8 Q: Do you agree with the way Mr. Kearney addressed the so-called Long 2 situation?

9 A: No, I do not. What has come to be called the Long 2 situation in this docket is the
10 situation in which Black Hills demand is lower than the minimum to which it can reduce
11 generation. In other words, Black Hills cannot "back down" its resources to match
12 demand. In that situation, Black Hills has excess energy to dispose of. It typically sells
13 that energy in the marketplace and realizes an income from it.

14 If Fall River is generating energy when Black Hills is in the Long 2 situation, Mr.
15 Kearney believes Order 69 infers that Black Hills has no obligation to sell that energy.
16 Order 69 was written in 1980. Energy markets have changed substantially since 1980.
17 Today there are both organized and bi-lateral markets that operate in the United States,
18 providing utilities with an opportunity to buy and sell energy to balance their systems
19 hourly. Utilities outside of organized markets have "all excess energy" agreements with
20 other utilities in which one utility is obligated to take and pay for all of the excess energy
21 of another utility and routinely buy and sell excess energy. By way of example, Black
22 Hills and Cheyenne Light and Power, utilities owned by the same parent corporation,

1 have such an agreement. Black Hills has long operated an energy trading desk. Today it
2 sells virtually all of its excess energy and has done so for years.

3 If Fall River generates electricity and Black Hills sells it without paying for it, the
4 money Black Hills receives for the electricity is a windfall to the company and its
5 shareholders. Black Hills incurs no expense but realizes the income from the electricity.

6 Q: Has the Federal Energy Regulatory Commission taken a position on this issue?

7 A: Not directly. Northwestern Corporation faced the question in South Dakota in EL 16-021
8 and in several dockets in Montana. Northwestern petitioned FERC for a declaratory
9 ruling slightly more than a year ago. The petition was assigned FERC docket number EL
10 19-3-000. FERC has not yet decided the question. There is no other FERC guidance
11 directly on point.

12 Q: Can the income Black Hills will receive from the sale Long 2 energy be modeled?

13 A: A revenue differential approach to avoided cost can be tailored to include Long 2
14 situations. The ABB price forecasts predict the value of electricity and capacity on those
15 future occasions that Black Hills will be in the Long 2 situation. It is not difficult to
16 calculate the value of the electricity Fall River will supply during those periods to the
17 calculation of levelized avoided cost.

18 Q: Have you calculated the effect on Mr. Kearney's computation of levelized avoided cost in
19 this docket?

20 A: In this docket the effect is rather small. Mr. Kearney calculated the difference in
21 levelized avoided cost as about \$0.24 per megawatt hour. I calculate the effect as
22 negligible based on Black Hills Attachment SDPUC 1-13 - Dump Energy.xlsx. In their
23 third submittal they indicate the total dump energy over 20 years as 14.9 GWhr which is

1 0.4% of Fall River’s total production. Given that Fall River will produce energy during
2 daylight hours and even a small energy increase of 1% per year the Long 2 situation is a
3 small factor for the Fall River avoided cost calculation.

4 Q: How did Black Hills calculate the value of capacity for the Fall River project?

5 A: As Mr. Kearney explained in his testimony, when calculating avoided cost, the modeling
6 program tries to balance generating capacity to demand in future years. As demand
7 increases, or generating facilities are retired and replaced, or both, the modeling program
8 needs to know what Black Hills will acquire as its next generating resource. The
9 modeling program must then employ the capital and operational costs of that facility
10 looking forward. Because utilities must be prudent in their capital expenditures and
11 because prudence typically translates to the least cost alternative, the modeling program
12 examines the cost of constructing and operating several types of generating resources.
13 The least costly method of generation is chosen. The so-called “least cost” choice is then
14 included in differential revenue model. Black Hills didn’t do that. Instead Black Hills
15 used forecast market prices plus an arbitrary 20% premium.

16 Q: Is Black Hills market price purchases approach appropriate for calculating avoided cost?

17 A: I do not agree with Black Hills use of its expected purchases in the market place, plus a
18 premium, to be an accurate or accepted method of calculating avoided cost, particularly
19 given that Black Hills offers no support for its use of 20% as the premium.

20 Q: Do you agree with Mr. Kearney that a simple cycle gas peaking generator is the
21 appropriate least cost alternative for determining the value of capacity?

22 A: As I said earlier in my testimony, if Black Hills does not intend to build SD Sun I and the
23 Commission determines that SD Sun I should not be included in avoided cost

1 calculations, then I agree with Mr. Kearney that the likely least cost alternative is a
2 simple cycle gas peaking generator.

3 Q: Mr. Kearney used the 2018 so-called “cost of new entry” values (CONE values)
4 calculated by two Regional Transmission Operators (RTOs), the Midcontinent
5 Independent Systems Operator (MISO) and the Southern Power Pool (SPP) as the cost of
6 a new simple cycle gas peaking generator. Is that acceptable?

7 A: Parts of South Dakota are in MISO, SPP and WECC, and Black Hills has said it is
8 interested in joining SPP. Accordingly, I think it is reasonable to average the MISO and
9 SPP CONEs to arrive at a cost factor for a new simple cycle gas peaking generator. Mr.
10 Kearney increased the value by 2% inflation to arrive at a 2021 value, which also is
11 reasonable, although I think 2% inflation is low, as reflected in my testimony above.

12 Q: Black Hills used 63% as the capacity contribution factor or accredited capacity factor for
13 solar photo-voltaic generators in its calculations but Mr. Kearney used 50%. Do you
14 agree with Mr. Kearney’s use of 50% as the capacity factor?

15 A: Capacity contribution factor or “Accredited Capacity Factor” represents the percentage of
16 the name plate capacity a generator will produce over time at peak utility load conditions.
17 By way of example, if a photo voltaic generating device has the potential to generate 100
18 watts of electricity, but because of seasonal sun angles, weather and cloud cover, the
19 device obviously will not produce 100 watts 100% of the time. The latest technology
20 utility scale photo voltaic solar generators deployed in areas similar to exposure and
21 weather to Fall River’s location, have a capacity factor of 27% to 30% depending on the
22 use of trackers and bi-facial panels. However, during peak loads, the Fall River Solar
23 output may be close to 70 MW during the summer and 30 MW during the winter.

1 Accordingly, Mr. Kearney's 50% capacity contribution factor is low. In my opinion, a
2 new photo voltaic utility scale generator with a tracking system and using bi-facial panels
3 which will increase the winter production will have an average capacity contribution
4 factor of 62.5%.

5 Q: If Black Hills' 63% capacity contribution factor is employed, how much will Mr.
6 Kearney's levelized avoided cost for capacity increase?

7 A: Approximately \$ 1.93 per megawatt hour.

8 Q: If your 62.5% capacity contribution factor is employed, how much will Mr. Kearney's
9 levelized avoided cost for capacity increase?

10 A: Approximately \$ 1.85 per megawatt hour.

11 Q: If Mr. Kearney's estimation of avoided cost is changed to comport with the opinions you
12 express, what is the final levelized avoided cost?

13 A: As expressed above, in my opinion the following adjustments should be made in Mr.
14 Kearney's calculation:

15 1. Energy growth should not be a negative but rather 1%, which increases levelized
16 avoided cost by \$.23 per megawatt hour.

17 2. Inflation should be 2.45% which increases levelized avoided cost by \$.67 per
18 megawatt hour.

19 3. Black Hills should pay for Fall River's generation during Long 2 periods at the
20 forecast market rate, which increases levelized avoided cost by \$.24 per
21 megawatt hour.

1 4. The capacity contribution factor or accredited capacity factor for the Fall River
2 solar generators should be 62.5%, which increases levelized avoided cost by
3 \$1.85 per megawatt hour.

4 The total is \$ 2.99 per megawatt, which when added to Mr. Kearney's estimate results in
5 a levelized avoided cost of \$ 37.29 per megawatt hour.

6 Q: Do you make any reservations with respect to your rebuttal testimony?

7 A: Yes, after reading and studying any rebuttal testimony or updates and changes Black
8 Hills or the Commission staff present, and after discovery is completed, I may have
9 additional direct and/or rebuttal testimony. Accordingly, I reserve the right to
10 supplement, amend or modify the conclusions and opinions I have expressed in this and
11 my direct testimony. I will timely update and make corrections to my testimony before
12 trial.