

ORIGINAL
EXHIBIT

STATE OF INDIANA

FILED
September 5, 2018
INDIANA UTILITY
REGULATORY COMMISSION

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF SOUTHERN INDIANA)
GAS AND ELECTRIC COMPANY d/b/a VECTREN)
ENERGY DELIVERY OF IN DIANA, INC., FOR: (1))
AUTHORITY TO CONSTRUCT, OWN AND)
OPERATE A SOLAR ENERGY PROJECT AND A)
FINDING THAT SUCH PROJECT CONSTITUTES A)
CLEAN ENERGY PROJECT PURSUANT TO IND.)
CODE CH. 8-1-8.8; (2) ISSUANCE OF A)
CERTIFICATE OF PUBLIC CONVENIENCE AND)
NECESSITY FOR THE CONSTRUCTION OF THE)
SOLAR ENERGY PROJECT PURSUANT TO IND.)
CODE CH. 8-1-8.5; AND (3) AUTHORITY TO)
TIMELY RECOVER COSTS INCURRED DURING)
CONSTRUCTION AND OPERATION OF THE)
PROJECT IN ACCORDANCE WITH IND. CODE§ 8-)
1-8.5-6.5 AND IND. CODE§ 8-1- 8.8-11.)

CAUSE NO. 45086

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PUBLIC'S
EXHIBIT NO. 1
DATE 11-19-18 REPORTER AT

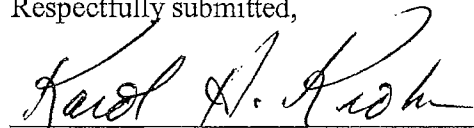
INDIANA OFFICE OF UTILITY CONSUMER COUNSELOR

PUBLIC TESTIMONY OF

JOHN E. HASELDEN – PUBLIC'S EXHIBIT NO. 1

SEPTEMBER 5, 2018

Respectfully submitted,



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TESTIMONY OF OUCC WITNESS JOHN HASELDEN
CAUSE NO. 45086
SOUTHERN INDIANA GAS AND ELECTRIC COMPANY
D/B/A VECTREN ENERGY DELIVERY OF INDIANA, INC.

I. INTRODUCTION

1 **Q: Please state your name and business address.**

2 A: My name is John E. Haselden, and my business address is 115 W. Washington St.,
3 Suite 1500 South, Indianapolis, Indiana 46204.

4 **Q: By whom are you employed and in what capacity?**

5 A: I am employed by the Indiana Office of Utility Consumer Counselor ("OUCC") as
6 a Senior Utility Analyst - Engineer in the Electric Division.

7 **Q: Please describe your educational background and experience.**

8 A: My qualifications are set forth in Appendix A to this testimony.

9 **Q: What is the purpose of your testimony?**

10 A: The purpose of my testimony is to show that Southern Indiana Gas and Electric
11 Company d/b/a Vectren Energy Delivery of Indiana Inc.'s ("Vectren") has not
12 demonstrated its proposed Solar Project meets applicable statutory requirements
13 under:

14 1. I.C. § 8-1-8.5-5(b)(3), because Vectren failed to demonstrate that the
15 public convenience and necessity requires or will require the construction
16 of the facility; and

17 2. I.C. § 8-1-8.5-7(4)(B), since Vectren failed to select a contractor through
18 bids solicited through a competitive procurement process.

19 I also demonstrate that the standard revenue requirements model Vectren used has
20 certain flaws, when applied to projects such as this, resulting in a cost to ratepayers

that is significantly higher than if a financing structure appropriate to this type of project were used. Projects such as Vectren's proposed Solar Project can achieve more economical results by using a discounted cash flow methodology common to renewable energy projects and other industries that utilize project financing.

Further, I show that Vectren's proposed Solar Project as currently structured and designed does not further the public interest in that it:

- Will yield few, if any, discernible benefits to Vectren's customers;
- Will potentially benefit only a few customers and only if those customers choose to participate in some manner;
- Is not necessary to meet capacity reserve requirements;
- Is not an economical choice for acquiring null energy;
- Does nothing to address the alleged desire of Vectren customers for renewable energy. As structured, Vectren customers will receive no renewable energy from the proposed Solar Project;
- Presents ongoing operating and maintenance risks to ratepayers that would not be present if Vectren had chosen other procurement methods;
- Is grossly overpriced compared to recent Indiana utility purchased power agreements ("PPA") for large solar farms? (Riverstart 200 MW in Randolph County for Hoosier Energy. 20 year PPA in the 4 cents/kWh range, NIPSCO recent Request for Proposal ("RFP") at an average price of 3.6 cents/kWh). Vectren has calculated the levelized cost per kWh for the Solar Project to be [REDACTED] cents/kWh.¹
- Results in a significant rate increase for Vectren ratepayers;²
- Is sized and designed to maximize financial and publicity results for Vectren at no risk to Vectren;
- If constructed and represented as described in Vectren's testimony and other company communications, will likely violate the Federal Trade

¹ Petitioner's Exhibit No.4, Attachment JCS-1, Levelized Cost Analysis (Confidential)

² Attachment JEH-1, OUCC DR 3.16

1 Commission's guidelines concerning the trading of Solar Renewable
2 Energy Certificates ("SRECs").³

3 Finally, I suggest ways in which the Solar Project or other similar projects might
4 be structured and designed to deliver the intended benefits at a far lower risk and
5 cost to ratepayers. These alternatives can deliver real value tailored to the needs of
6 customers and can be a sustainable model for future development as opposed to the
7 "one and done" project proposed in this proceeding.

8 **Q: Is the OUCC opposed to the development of solar photovoltaic ("PV") projects**
9 **such as the one presented in this Cause?**

10 A: Absolutely not. The OUCC has long been a steadfast supporter of renewable energy
11 in all forms.⁴ However, just because an energy project is classified as "renewable"
12 energy does not mean it is beneficial, necessary or even affordable. Unfortunately,
13 Vectren's proposed Solar Project is structured to deliver financial and public
14 relations benefits to Vectren under the otherwise noble guise of developing clean
15 energy. As proposed, this project should not be given a free pass just because it is
16 a solar project.

17 **Q: Please describe the review and analysis you conducted in order to prepare**
18 **your testimony.**

19 A: I reviewed the Verified Petition, Direct Testimony and Exhibits submitted by
20 Vectren in this Cause. I reviewed documents from Vectren's previous case
21 concerning solar PV (Cause No. 44909). I also reviewed other Indiana investor-
22 owned utility ("IOU") filings related to solar power. Finally, I met with Vectren

³ (<https://www.ftc.gov/enforcement/rules/rulemaking-regulatory-reform-proceedings/green-guides>)

⁴ A partial list of recent proceedings includes:

Cause No. 44953 – Duke Energy Indiana 11/21/17; Cause No. 4578 – Duke Energy Indiana 8/19/15; Cause No. 44734 – Duke Energy Indiana 7/6/16; Cause No. 44511 Indiana Michigan Power Company 2/4/15; Cause No. 44909 Southern Indiana Gas and Electric Company ("Vectren")

1 representatives to discuss its proposed Solar Project. I composed data requests
2 ("DRs") and read Vectren's responses.

3 **Q: Are you sponsoring any attachments in this proceeding?**

4 A: Yes. I am sponsoring:

- 5 • Petitioner's Exhibit No. 1, Attachment JEH-1: Responses to Selected DRs;
- 6 • Petitioner's Exhibit No. 1, Attachment JEH-2: Excerpt from the Vectren
7 2017 Vectren Corporation Sustainability Report and an article from the
8 Evansville Courier Press quoting Mr. Carl Chapman announcing the Solar
9 Project;
- 10 • Petitioner's Exhibit No. 1, Attachment JEH-3: The Corporate Renewable
11 Energy Buyer's Principles;
- 12 • Petitioner's Exhibit No. 1, Attachment JEH-4: Excerpts from the Hoosier
13 Energy 2018 Integrated Resource Plan ("IRP") and the NIPSCO 2018
14 Overall Summary and Pricing Received slide;
- 15 • Petitioner's Exhibit No. 1, Attachment JEH-5: Industry Trade Articles
16 concerning the impact of Solar PV Tariffs; and
- 17 • Petitioner's Exhibit No. 1, Attachment JEH-6: Discounted Cash Flow
18 Model (Confidential).

II. STATUTORY REQUIREMENTS

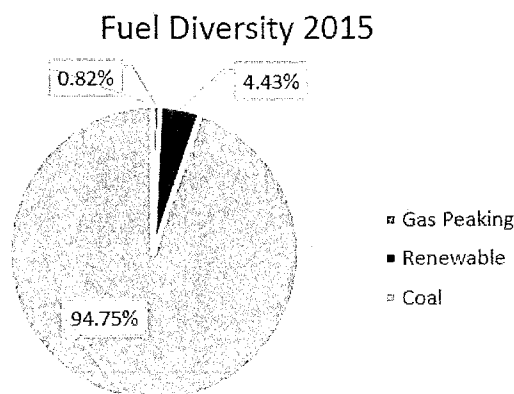
19 **Q: Has Vectren demonstrated the proposed Solar Project meets the statutory**
20 **requirements under I.C. 8-1-8.5-5?**

21 A: No. The statute requires the utility demonstrate that the public convenience and
22 necessity requires, or will require, the construction of the facility. As structured,
23 this proposed facility is not necessary to meet a need for capacity reserves or energy
24 at a cost better than can be obtained from the market or other sources as evidenced

by Vectren's recent IRP.⁵ Additionally, this project does not provide any renewable energy to customers.

Q: Vectren witness Mr. Wayne D. Games indicates on pages 15 and 16 of his testimony, the Solar Project will aid in the diversification of its power supply. Do you agree?

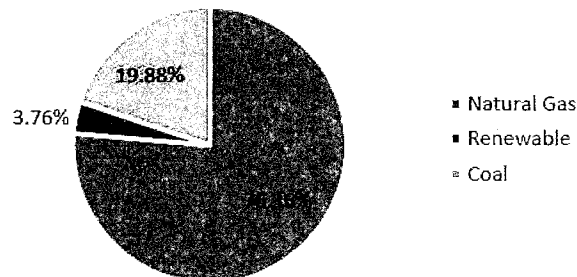
A: No. The addition of the proposed Solar Project will have a de minimis effect on Vectren's power supply diversification. Pie charts, provided on page 15 of Mr. Games' direct testimony, show categories of available capacity, including energy efficiency, in 2015 and forecasted for 2036; however, this does not represent the diversification of the energy supplied. If units do not run or run sparingly, they do not contribute to diversity of the power supplied. In response to OUCC DR 3.3⁶ requesting a similar breakdown of energy generated by source for the same time periods (actual for 2015 and forecasted for 2036), the resulting charts look differently:



⁵ Petitioner's Exhibit No. 1, Attachment WDG-4

⁶ Attachment JEH-1

Fuel Diversity 2036



There is obviously a large shift from coal to gas. However, the portion attributable to solar in 2015 and forecasted in 2036 is extremely small -- approximately 1% of the total. The remaining 2-3% of the renewable slice in 2036 is comprised of landfill gas and assumed wind contracts. This is a true representation of the power diversity to be supplied, with the exception that power supplied by the MISO market is omitted. It can certainly be argued that Vectren's energy supply diversity will significantly change and become less diverse with respect to renewable energy.

Q: Mr. Games notes, on pages 15 and 16 of his testimony, that construction of the proposed Solar Project is consistent with achieving the Preferred Portfolio Resource mix set forth in Vectren's 2016 IRP. Do you agree?

A: Yes. However, when asked in OUCC DR 1.3 for the reasoning behind the 50 MW solar selection, Vectren responded:

The optimized computer generated portfolios chose larger solar projects as the best renewable option due to the economies of scale associated with the larger facilities and the expected energy output during the daily on-peak demand periods.⁷

⁷ Attachment JEH-1, OUCC DR 1.3

1 In reviewing Vectren's IRP modeling output, I found that indeed, 50 MW of solar was a
2 better choice than 9 MWs of solar due to economies of scale in pricing. However, the model
3 was forced to select 50 MWs of solar in 2019. This was not an optimal economic selection
4 over other resources. The selection of renewables in the preferred portfolio was a subjective
5 decision that gives the appearance of diversification.

6 **Q: Is the proposed Solar Project necessary for capacity or reserve margin requirements**
7 **to serve Vectren customers?**

8 A: No. Vectren's plan as detailed in its IRP contemplates retirements of some generating units
9 and the construction of a Combined Cycle Gas Turbine ("CCGT") (pending Cause No.
10 45052). Subsequently, Vectren expects to have excess capacity of 200 MWs in 2025 and
11 100 MWs in 2036.⁸

12 **Q: Vectren witness Mr. Thomas L. Bailey states on pages 4 through 6 of his direct**
13 **testimony that the proposed Solar Project is needed to assist corporations with their**
14 **renewable goals and to retain or attract large customers. Do you agree?**

15 A: In part. I agree that a few large customers have renewable energy, carbon reduction or
16 sustainability goals, and the availability of renewable energy is important for attracting
17 some new customers. However, as structured, Vectren's proposed Solar Project satisfies
18 none of these goals, and therefore is not needed for his stated purpose. No renewable energy
19 will be delivered to Vectren's customers. There is a possibility that one company might
20 sign a PPA for an undefined amount of power.⁹ That customer's total consumption in 2017
21 was [REDACTED]¹⁰ which is approximately [REDACTED] of the proposed Solar Project's output.

22 In addition, the companies Mr. Bailey references on pages 4 and 5 of his testimony, while

⁸ Attachment JEH-1, OUCC DR 1.16 and 2.1

⁹ Bailey, Attachment TLB-2

¹⁰ Attachment JEH-1, OUCC DR 3.11

undoubtedly supportive of renewable energy, were not informed that the SRECs would be sold to the market and the power they might receive from Vectren will contain no renewable energy.¹¹ Having full knowledge of Vectren's proposed Solar Project's structure might temper the customers' enthusiastic support. Later in my testimony I discuss in greater detail the issues around satisfying customer needs or desires for renewable energy with the proposed Solar Project as structured.

Q: Has Vectren met the statutory requirements to qualify the proposed Solar Project under I.C. 8-1-8.5-7?

A: No. Pursuant to I.C. 8-1-8.5-7(4)(B)(ii), the utility is required to select a contractor through a competitive procurement process. Vectren did not issue an RFP for alternative sources and did not solicit bids for any components (i.e. PV panels, inverters, etc.) or for labor to construct the proposed Solar Project.¹²

III. CUSTOMER NEED FOR RENEWABLE ENERGY

Q: What Vectren customers have expressed a need for renewable energy?

A: As described above and in Mr. Bailey's testimony, there are several large customers that have future renewable energy, carbon reduction or sustainability goals and the availability of renewable energy is important for attracting certain new customers. There is also a small but vocal group of residential customers interested in renewable energy, many of whom have installed their own solar PV systems. Additionally, outside advocacy groups have their own agendas on this topic.

¹¹ Attachment JEH-1, OUCC DR 1.24

¹² Attachment JEH-1, OUCC DR 1.2

1 **Q: Has Vectren conducted any market research of its customers on this topic?**

2 A: Yes.¹³ In focus groups, respondents ranked natural gas and wind/solar as “the best” options
3 for Vectren with natural gas being the happy medium between cost and less pollution.
4 Vectren also conducted an on-line survey to gauge interest in a potential community solar
5 program. The survey showed that customers generally find the solar energy concept
6 appealing.

7 **Q: On page 5 of Mr. Bailey’s testimony, he cites several examples of Vectren’s corporate**
8 **customers committed to the Corporate Renewable Energy Buyer’s Principles. Will**
9 **the proposed Solar Project, as structured, satisfy these customers’ requirements?**

10 A: Possibly. I have attached a copy of the Corporate Renewable Energy Buyer’s Principles at
11 Attachment JEH-3. For those companies that commit to these principles, a few of the
12 critical purchasing goals are:

- 13 1. Access to new projects that result in new renewable power generation;
- 14 2. The ability to add more renewable energy to the system and claim the consumption
15 of the relevant renewable energy and greenhouse gas (“GHG”) emission benefits
16 while preventing another energy user from claiming consumption of the same
17 renewable energy; and
- 18 3. To purchase renewable energy that reflects the net costs and benefits to the system,
19 including the actual cost of procurement and benefits, such as, but not limited to,
20 avoided energy and capacity benefits, without impacting other ratepayers.

21 As currently structured, Vectren’s stated intent to sell the Solar Renewable Energy
22 Certificates (“SRECs”) to the market cancels the value of the renewable attributes of the
23 proposed Solar Project to both Vectren and those customers who wish to commit to the

¹³ Attachment JEH-1, OUC DR 1.11

1 Corporate Renewable Energy Buyer's Principles. This could be changed if the proposed
2 Solar Project was contracted to one or more customers using the letter of intent model
3 provided in Attachment TLB-2. This arrangement would be similar to a community solar
4 model and would remove the rate impact from all other ratepayers as noted in the third goal
5 above.

6 **Q: Are there other ways Vectren can structure its proposed Solar Project to satisfy the**
7 **desire of the "several large customers that have expressed an interest in solar**
8 **power"¹⁴?**

9 A: Yes.

10 **Q: Please explain these alternatives.**

11 A: As discussed previously, it is critical to understand that customers subscribing to these
12 principles require, among other things, their renewable energy procurement result in new
13 renewable power generation. Vectren could structure the proposed Solar Project as a
14 "Community" solar farm wherein customers voluntarily subscribe or invest directly in the
15 project. This is a common arrangement in other states and in this way, other non-
16 participating customers are not impacted. Vectren could develop the proposed Solar Project
17 on behalf of those few interested customers and not necessarily open the Solar Project to
18 the public or, alternatively, reserve a small portion of the farm for other interested
19 customers. In addition, Vectren could develop a DSM program wherein customer-sited
20 projects are subsidized, leased or integrated into a micro grid configuration for those
21 customers desiring and willing to pay for this type of service. Vectren could explore
22 entering into a PPA with Orion or in conjunction with Hoosier Energy for a smaller share
23 of the output that would be tailored to a size appropriate for the customers wishing to

¹⁴ Vectren's Verified Petition, Page 3

1 subscribe to the project. This approach would have the added benefit of eliminating the
2 operational and maintenance risks associated with owning the project.

3 **Q: Did Vectren investigate any of these alternative structures?**

4 A: No. Although Mr. Games states on page 6 of his direct testimony that Vectren was
5 approached by Orion regarding Vectren's interest in either a PPA or partnering in the Solar
6 Project, Vectren went straight into negotiating the Asset Purchase Agreement. When asked
7 if Vectren was offered a PPA or whether Vectren requested indicative pricing and terms of
8 a PPA, Vectren answered, "No." Vectren did not conduct an RFP for procurement of
9 renewable energy from other developers and did not investigate or conduct an RFP for
10 procurement through a PPA.¹⁵ It appears that Vectren started with its preferred answer and
11 attempts to justify the reasonableness of the estimated costs by offering a witness who
12 reviewed only a portion of the components. Vectren also claims the capital cost is
13 comparable to other recent Indiana utility projects that have been constructed; although, as
14 I discuss below, these other projects are neither recent nor comparable in size or design.
15 This was acknowledged by Vectren in its response to OUCC DR 2.7.¹⁶ Recent Indiana
16 utility PPAs for large solar farms indicate Vectren's proposed Solar Project should cost far
17 less and without the operation and maintenance ("O&M") risk than the revenue
18 requirements calculated by Vectren. For example, Hoosier Energy is utilizing 20-year, 200
19 MW PPA with Riverstart Solar Farm in Randolph County with costs in the 4 cents/kWh

¹⁵ Attachment JEH-1, OUCC DR 2.5 and 3.8

¹⁶ Attachment JEH-1, OUCC DR 2.7

range, and NIPSCO's IRP Public Advisory Meeting 3, PowerPoint Presentation, Slide 19, shows 16 Indiana solar projects bid an average price of 3.6 cents/kWh.¹⁷

Q: What reasoning did Vectren provide for owning the Solar Project instead of entering into a PPA?

A: In response to OUCC DR 3.8,¹⁸ Vectren stated the benefits were related to direct control over the site and the project, as well as the option to modify the technology at the site and avoid any risks concerning the long-term financial strength of a non-regulated provider. These are very weak concerns that can be readily remedied in a well written PPA. It is common in such agreements for the financing entities to have the right to protect their investments by curing defaults if the operating entity fails in some manner. Further, performance obligations can be specified in a PPA. However, in this case where there is no need for the capacity or the power and there is no mandate for renewable energy in its generating portfolio, such a requirement is not necessary.

Q: Is it urgent that the proposed Solar Project be completed in 2020 in order to satisfy customer needs?

A: No. Of those customers that have expressed a renewable energy need to satisfy corporate goals, the earliest deadline is 2020 by customer Astra-Zeneca. Other customers Vectren cited with goals such as Toyota, Walmart, Berry Global, etc. have later deadlines, although Vectren does not know what their requirements might be.¹⁹

¹⁷ Attachment JEH-4

¹⁸ Attachment JEH-1, OUCC DR 3.8

¹⁹ Attachment JEH-1, OUCC DR 3.12

1 **Q: What are your concerns with regard to Vectren's representations of its proposed**
2 **Solar Project?**

3 A: Vectren has repeatedly stated in testimony and other company communications that the
4 proposed Solar Project will deliver renewable energy to its customers or will be a
5 renewable energy resource for its customers.²⁰ However, Vectren has also stated that it
6 plans to sell the SRECs to the market to minimize the project's cost. By making dueling
7 statements such as those referenced, Vectren would be in violation of the guidelines of the
8 Federal Trade Commission concerning the trading of SRECs by offering the SRECs to the
9 market while representing to its customers that they are receiving renewable energy.²¹

IV. PROCUREMENT PROCESS

10 **Q: Do you have concerns with Vectren's procurement process for its proposed Solar**
11 **Project?**

12 A: Yes. Vectren sought no competitive alternatives to acquiring solar resources within its
13 service territory. Vectren sought no alternative procurement structures other than a build-
14 to-own arrangement.

15 **Q: What competitive alternatives might Vectren have pursued to serve the needs of**
16 **customers for renewable energy?**

17 A: There are several alternatives Vectren can explore:

- 18 1. Structure the proposed Solar Project as a "community solar" project.
- 19 2. Conduct an RFP for developers to provide solar power through a PPA arrangement.
- 20 3. Conduct an RFP for developers to provide solar power through a build-transfer
- 21 arrangement.

²⁰ Games page 14, lines 32-33; Games page 17, lines 8-9; Bailey page 4, lines 26-29; page 6, 11-12; page 6 lines 19-21; Attachment JEH-5

²¹ (<https://www.ftc.gov/enforcement/rules/rulemaking-regulatory-reform-proceedings/green-guides>)

1 4. Offer a feed-in tariff reverse auction solicitation for customers or developers to develop
2 solar/renewable energy projects within Vectren's service territory.

3 5. Acquire the land leases from Orion and conduct an RFP for an Engineering,
4 Procurement, and Construction ("EPC") contract on the site.

5 6. Explore a joint venture with Hoosier Energy at Vectren's proposed site or other
6 locations.

7 **Q: Why didn't Vectren pursue any of these alternatives?**

8 A: Vectren has indicated that the only way it wishes to proceed is to build and own it at its
9 proposed site. Vectren cites advantages to this approach due to economies of scale and its
10 opinion that there are no other locations available in its service territory for a project of this
11 size.²²

12 **Q: Do you have an opinion why Vectren did not pursue any competitive alternatives?**

13 A: Yes. First, alternatives like PPAs, feed-in tariffs and community energy projects do not
14 make money for Vectren shareholders. Taking advantage of the Clean Energy Cost
15 Adjustment ("CECA") mechanism to pass costs on to ratepayers is a riskless way to earn
16 a return. As structured, the proposed Solar Project need not produce anything in order for
17 Vectren to collect all of its revenue requirements. For Vectren, this is like a 30-year, 6%
18 CD. Under traditional ratemaking conventions, these types of projects are cash machines
19 for utilities. The simple math is Vectren's after-tax ROE [REDACTED] times the investment
20 [REDACTED] equals \$3,545,276 in the first year alone.

21 Second, if a utility applies conventional revenue requirements accounting treatment
22 to a project, it should always result in a higher levelized average price per kWh than the
23 price for acquiring the same power under a PPA with another party. Conducting an RFP

²² Attachment JEH-1, OUCC DR 3.8 and OUCC DR-4.2

1 for a long-term PPA would expose this fact and the motivation behind a decision to self-
2 build.

3 Third, larger intermittent projects connected to a utility's distribution system can
4 represent engineering challenges to the operation of the system and are therefore
5 inconvenient as opposed to simply connecting a large array to the bulk transmission system
6 as proposed here.

7 Fourth, the image value of a Vectren-owned large tracking solar array is more
8 valuable than many projects owned by others or customers for which Vectren is just the
9 off-taker of power. However, Vectren should pay for the image building, and not captive
10 ratepayers.

VI. COMPETITIVE PRICING

11 **Q: Why should the price under the terms of a PPA be less than that of a utility-owned**
12 **project?**

13 A: There are four primary factors. First, the capital structure of an investor-owned utility like
14 Vectren is very conservative with a large equity component that earns a higher rate of return
15 than debt. Those companies that build and offer long-term PPA contracts are much more
16 leveraged. Consequently, the weighted cost of capital for these companies is significantly
17 lower. Second, the traditional revenue requirement modeling, as demonstrated by Cas
18 Swiz' Attachment JCS-1, does not follow the cash flow reality, ignores the time value of
19 money and ignores the income tax effects. A developer would use a discount cash flow
20 model to arrive at the price per kWh necessary to finance the project. Third, for a project
21 such as this that receives CECA tracker recovery for every expense regardless of output
22 should have a return on equity ("ROE") much lower than the ROE for the whole utility.
23 There is virtually no risk premium. Fourth, developers seeking to win a PPA are typically

1 competing for the business and “sharpening their pencils” to the extent possible to take
2 advantage of industry innovations and market changes. In this case, Vectren is not
3 competing with anyone and any changes or innovations will accrue to First Solar.

4 **Q: What are examples of the differences in the treatment of cash flows to which you**
5 **refer?**

6 A: Referencing JCS Attachment 1, the investment tax credit (“ITC”) is amortized over the 30
7 year life of the proposed Solar Project. This is conventional treatment as prescribed by the
8 Internal Revenue Service.²³ In reality, a developer would take the full ITC as soon as
9 possible. Also in JCS Attachment 1, depreciation is taken as a straight-line amount spread
10 over 30 years. In reality, the proposed Solar Project would be eligible for 5-year accelerated
11 depreciation. The benefit of the accelerated depreciation is the positive cash flow resulting
12 from reducing federal income taxes paid. Instead, Vectren shows depreciation as a cost
13 spread over 30 years as prescribed by accounting rules and no recognition of the accelerated
14 depreciation tax advantage or time value of money.

15 **Q: How does the calculation of the levelized cost of power using traditional revenue**
16 **requirements modeling compare to a discounted cash flow analysis?**

17 A: I modeled the proposed Solar Project using Vectren’s numbers for property taxes,
18 estimated O&M, capital cost, ITC, annual energy production, and after tax weighted
19 average cost of capital (“WACC”). I applied the tax effects to the discounted cash flow and
20 solved for a flat price of power/kWh. The result was 5.5 cents/kWh compared to Vectren’s
21 revenue requirement of approximately [REDACTED] cents/kWh. My discounted cash flow
22 spreadsheet is attached as Attachment JEH-6 (Confidential). I estimate that using a less
23 conservative capital structure and more current materials pricing, and eliminating the

²³ Attachment JEH-1, DR 3.15

tracking system, the price of power could be driven down to the 4 to 5 cents/kWh range.

This is similar to the Riverstart Solar Farm project previously referenced.

Q: What do you conclude about your analysis?

A: I conclude that:

1. The standard revenue requirements treatment of project costs for projects with significant tax incentives does not fully capture the true economic value of those incentives or the time value of money.

2. The standard revenue requirements treatment of project costs for projects such as the Solar Project proposed by Vectren, and projects proposed by other utilities, uses an inappropriate capital structure that does not reflect the low risk for tracked projects that have no performance responsibility.

3. Operations risk is also borne by ratepayers as opposed to no risk under a PPA.

4. All things being equal, a project will cost ratepayers more under traditional ratemaking than the same project from which the power is obtained under the terms of a PPA.

Q: What do you recommend as a result of your analysis?

A: I recommend any utility, such as Vectren here, be required to conduct RFPs for renewable energy projects, especially soliciting PPAs. Additionally, a utility should be required to explore modifications to its ratemaking treatment of such projects. This will require utilities that wish to own such projects to compete on a level playing field with other alternative means of procurement and ensure that ratepayers are paying the lowest reasonable cost for the energy they use.

V. PROJECT DESIGN

Q: Do you have concerns about the design of the proposed system?

A: No, not at this point. However, key components of the proposed Solar Project, such as the inverters, have not been specified. I do have a concern about Vectren's assumption that the inverters will last the life of the proposed Solar Project. Vectren states that the design life of an inverter is 25-30 years and should last that long with proper maintenance.²⁴ It is generally recognized in the industry that inverters will need to be replaced, on average, every 12-15 years. Some may last their design life but on average, they will not. Vectren has not allowed for this major O&M expense in its pro forma revenue requirements.

Q: Do you have concerns with regard to the estimated cost of the proposed Solar Project?

A: Yes. Costs for similar Solar Projects continue to decrease as technology improves and the market becomes more competitive. A little over a year ago, Vectren rejected a single axis tracking system for solar PV projects, approved in Cause No. 44909, because it thought a fixed system would be more cost effective. That trend has abruptly changed in favor of single axis tracking systems, where site terrain allows. Vectren witness Mr. Matthew R. Brinkman testified regarding the reasonableness of module prices at the time they were negotiated, absent any competitive solicitation. Mr. Brinkman only compared the prices of some components of the proposed Solar Project to historical pricing to reach his conclusion. However, the historical as well as current trend is continued reduction in costs. I agree with Mr. Brinkman's statement that, "By locking in a price of [REDACTED]/Wdc, Vectren South achieved cost certainty for the Company and its customers."²⁵ Unfortunately, this

²⁴ Attachment JEH-1, OUCC DR 2.6 and 3.9

²⁵ Petitioner's Exhibit No. 2, page 6, lines 15-16

1 decision also locked in a higher price than what can be realized today. Vectren has entered
2 into a fixed priced contract for the proposed Solar Project and it will be First Solar that
3 gleans additional profits from the declining market and sharpening of its pencils on design.
4 To borrow a quote from the famous hockey player, Wayne Gretzky, "I skate to where the
5 puck is going to be, not where it has been."

6 **Q: Why is Vectren limiting the amount to 50 MW?**

7 A: The answer is somewhat elusive. As discussed earlier in my testimony, when asked in
8 OUCC DR 1.3 about how the 50 MW capacity was determined, Vectren responded in
9 essence that larger projects are better due to economies of scale. If so, one is left to question
10 why Vectren did not chose a 60 MW or 100 MW project.

11 In response to OUCC DR 2.4(c), Vectren states that 50 MW is the size constraint
12 for interconnection²⁶ despite the fact that MISO approved up to 70 MW through Phase I
13 of the process. When the OUCC followed up on this second and different response in its
14 DR 3.7(b), Vectren responded, "...the developer has not been able to secure sufficient land
15 leases to support a 70 MW AC project therefore limiting the overall output to its current
16 size."²⁷

17 Vectren further stated that the proposed Solar Project will occupy approximately
18 300 acres of 1,034 acres leased.²⁸ Even with allowances for wetlands, setbacks and other
19 uses, more capacity could be added. It may be no coincidence that qualifying the proposed
20 Solar Project under I.C. § 8-1-8.5-7 limits the maximum nameplate capacity to 50 MW.

21 **Q: Is it critical that Vectren start construction of its proposed Solar Project by the end**
22 **of 2019?**

²⁶ Attachment JEH-1, DR 2.4(c)

²⁷ Attachment JEH-1, DR 3.7(b)

²⁸ Attachment JEH-1, DR 3.4

A: No. Mr. Games points out in his direct testimony, page 19, this is necessary to take full advantage of the ITC. The ITC for solar projects will begin to phase down to 10% after 2019 according to the following schedule:

2019	30%
2020	26%
2021	22%
2022	10%

To attain the full ITC, a small amount of work must be done in 2019 but the proposed Solar Project does not need to be completed until December 31, 2023. Given there is a four year window to complete a project that should take about a year, Vectren could start construction at the interconnecting substation by the end of 2019 and still have plenty of time to complete the proposed Solar Project if the planned spring 2019 construction start were delayed. If the proposed Solar Project start was delayed a year, the project would still be eligible for a 26% ITC. This difference is not critical to the economics of the project. Further, as detailed in Vectren's Attachment JCS-1, some elements of the proposed Solar Project do not qualify and therefore only 93.8% of the project is eligible for the ITC, regardless of when construction commences. In other words, Vectren will only get an approximate 24% ITC if the Solar Project starts by 2019.

Q: Mr. Games discusses the benefits of the module sale agreement with First Solar as representing an important hedge against anticipated increases in prices. Do you agree?

A: At the time of Vectren's discussions with First Solar, the possibility of tariffs on Chinese solar panels did cause a stir in the industry. Many large importers of panels bought large amounts of panels in anticipation of the tariff in order to assure their own supply needs as

1 well as an arbitrage maneuver. However, as Mr. Games points out, the panels anticipated
2 for the proposed Solar Project are not of the type affected by the tariff, nor are they
3 manufactured in China. It was speculated that a tariff on polycrystalline panels made in
4 China would cause an increase in price in due to increased demand in the thin film
5 alternative product. This has not turned out to be the case²⁹

VI. CONCLUSION

6 **Q: What do you conclude?**

7 A: Throughout my testimony I have expressed concerns about many detailed issues and
8 offered alternatives. Regarding Vectren's proposed Solar Project, I make two simple
9 proposals:

- 10 1. Vectren should acquire solar power, from its proposed Solar Project or some other
11 project(s), at the lowest reasonable cost to participating customers; and
- 12 2. Vectren should provide the opportunity for customers to access renewable energy
13 for their own purposes without unduly impacting other ratepayers.

14 As proposed, Vectren's Solar Project satisfies neither of these goals.

15 I agree that the proposed Solar Project is a unique opportunity to construct a large
16 solar project at a location within Vectren's service territory. However, I urge Vectren to
17 revisit the solar power procurement in the context of offering a product to those interested
18 customers for whom it actually satisfies their renewable energy criteria. Those customers
19 who wish to acquire renewable energy that conforms to the Corporate Renewable Energy
20 Buyer's Principles or other criteria should be encouraged to commit to be off-takers beyond

²⁹ Attachment JEH-5

1 expressing good intentions. If there are not enough customers subscribing, then the
2 proposed Solar Project should be postponed. The Solar Project costs should not be unfairly
3 shouldered by non-participating captive ratepayers.

4 **VII. RECOMMENDATIONS**

5 **Q: What is your recommendation to the Commission in this cause?**

6 A: I recommend the Commission deny Vectren a CPCN for its proposed Solar Project in this
7 case.

8 **Q: Do you have an alternative recommendation for the Commission to consider?**

9 A: Yes. In the alternative, I recommend that the Commission require Vectren to solicit the
10 market for competitive prices for projects in a broad range of sizes to be located in their
11 service territory. The solicitation should include PPAs from customers and developers. I
12 also recommend that ROE, as it applies to the proposed Solar Project, be modified such
13 that the levelized cost of power to customers is no greater than 4 cents/kWh for the kWh
14 the Solar Project produces each year. I further recommend that the Commission allow the
15 proposed Solar Project be postponed until such time that the output of the Solar Project can
16 be contracted to interested customers through individual PPAs.

17 **Q: Does this conclude your testimony?**

18 A: Yes, it does.

APPENDIX TO TESTIMONY OF
OUCC WITNESS JOHN E. HASELDEN

Q: Please describe your educational background.

A: I am a graduate of Purdue University with a Bachelor of Science degree in Civil Engineering. I am also a graduate of Indiana University with the degree of Master of Business Administration, majoring in Finance. I am a registered Professional Engineer in the State of Indiana. I have attended and presented at numerous seminars and conferences on topics related to demand-side management ("DSM") and renewable energy.

Q: Please describe your utility business experience.

A: I began employment with Indianapolis Power & Light Company in April, 1982 as a Design Project Engineer in the Mechanical-Civil Design Engineering Department. I was responsible for a wide variety of power plant projects from budget and cost estimation through the preparation of drawings, specifications, purchasing and construction supervision.

In 1987, I became a Senior Engineer in the Power Production Planning Department. I was responsible for assisting and conducting studies concerning future generation resources, economic evaluations, and other studies.

In 1989, I was promoted to Division Supervisor of Fuel Supply and in 1990, became Director of Fuel Supply. I was responsible for the procurement of the various fuels used at IPL's generating stations.

In 1993, I became Director of Demand-Side Management. I was responsible for the development, research, implementation, monitoring, and evaluation of all marketing and DSM programs. In particular, I was responsible for the start-up of this new department and for the start-up and implementation of the DSM programs approved by the Commission in its Order in Cause 39672 dated September 8, 1993. The DSM Department was dissolved at IPL in 1997 and I left the company.

From 1997 until May, 2006, I held the positions of Director of Marketing and later, Director of Industrial Development and Engineering Services at The Indiana Rail Road Company. I was responsible for the negotiation of coal transportation contracts with several electric utilities, supervision of the Maintenance-of-Way and Communications and Signals departments, project engineering, and development of large capital projects.

I rejoined IPL in May, 2006 as a Principal Engineer in the Regulatory Affairs Department. I was responsible for the evaluation and economic analysis of DSM programs and assisted in the planning and evaluation of environmental compliance options and procurement of renewable resources.

In May, 2018, I joined the OUCC as a Senior Utility Analyst - Engineer. I review and analyze utilities' requests and file recommendations on behalf of consumers in utility proceedings. As applicable to a case, my duties may also include evaluating rate design and tariffs, examining books and records, inspecting facilities, and preparing various studies.

Q: Have you previously testified before the Indiana Utility Regulatory Commission?

A: Yes. I have provided testimony in several proceedings on behalf of IPL regarding the subjects of Fuel Supply, DSM and renewable energy most recently in Cause Nos. 43485, 43623, 43960, 43740, 44328, 44018, and 44339. My testimony on DSM concentrated on the evaluation, measurement and verification (“EM&V”) of DSM programs. My testimony on renewable energy concentrated on IPL’s Rate REP (feed-in tariff, wind power purchase agreements and solar energy).

**Vectren South Responses to
OUCC Data Request Set No. 1
Cause No. 45086
Page 4**

Questions for Wayne Games:

Q 1.2: Please refer to pages 5-6 of Mr. Games' Direct Testimony.

- a. Did Vectren South ("Vectren") conduct an RFP for solar photovoltaic ("PV") capacity and energy during the past three years?
- b. If so, please provide all documents related to the RFP for the solar PV project proposed in this proceeding, including Vectren's solicitation for bids, and any bid packages received.
- c. If not, please explain why?

Response:

- a. No
- b. N/A
- c. As discussed on pages 4-9 of the direct testimony of Wayne D. Games, Vectren South was approached by a developer (Orion Renewable Energy Group, LLC ("Orion")) regarding a 50-70 MW large scale universal solar project located within Vectren South's service territory. The developer had secured most of the rights to property and applied for a MISO interconnect agreement. The fact that these steps already had been taken, provided Vectren South with the opportunity to select an engineering, procurement and construction ("EPC") contractor and start the project in 2019, which is both consistent with its IRP and allows Vectren South to take advantage of the 30% Investment Tax Credit ("ITC") before it drops to 26% in 2020, 22% in 2021 and 10% in 2022. The timing also allowed Vectren South to negotiate pricing with First Solar, a thin film technology solar module company, before solar tariffs were to take effect. At that time, First Solar was willing to lock in a price on thin film technology lower than any prices Vectren South was quoted for monocrystalline or polycrystalline panels. Vectren South was having difficulty securing panels for the smaller projects at the time and there was concern that the tariffs eventually would cause a higher demand and increased price on all solar panels, including thin film panels. In order to ensure that the module and EPC price offered by First Solar was competitive, Vectren South retained solar project expertise from Burns & McDonnell to assist in negotiating and ensuring competitive module and EPC prices for the project.

Witness: Wayne D. Games

**Vectren South Responses to
OUCG Data Request Set No. 1
Cause No. 45086
Page 5**

Q 1.3: How did Vectren arrive at the amount of 50 MW as the appropriate balance of solar PV in its generating portfolio?

Response:

Vectren South's 2016 IRP risk analysis modeling determined that a diverse generation portfolio to include coal, natural gas, energy efficiency and renewable energy was the preferred resource portfolio. The optimized computer generated portfolios chose larger solar projects as the best renewable option due to the economies of scale associated with the larger facilities and the expected energy output during the daily on-peak demand periods. The IRP indicates "Vectren plans to add 50 MW of solar in 2019, which corresponds with clean energy tax incentives for solar power plants." As reflected in the response to Data Request No. 1.2, Orion had secured the property rights and an interconnect agreement for a 50-70 MW large scale universal solar project, which made the sizing of the project consistent with 2016 IRP modeling. Having on-system solar effectively mitigates congestion risk.

Witness: Wayne D. Games

**Vectren South Responses to
OUCC Data Request Set No. 1
Cause No. 45086
Page 13**

Q 1.11: Please refer to page 14 of Mr. Games' Direct Testimony.

- a. Please provide evidence of the statement, "Vectren South's customers are increasingly interested in the use of more renewable resources to meet their energy needs."
- b. Has Vectren conducted any market research surveys or studies of their residential, small business or industrial customers about their interest in renewable energy?

Response:

- a. With respect to larger customers, see the testimony of Thomas Bailey. Regarding residential customers, as set forth below, Vectren South has conducted various forms of quantitative and qualitative research with our customers, which helps us to gauge interest in renewable energy and potential utility programs related to renewable energy. In addition, strong interest in renewable energy was expressed from several key stakeholders throughout Vectren South's 2016 Integrated Resource Plan (IRP) stakeholder process. Input has also been received at various public hearings and forums.
- b. Yes. In the summer of 2016, Vectren South conducted a series of focus groups with electric customers in southwestern Indiana. Various topics covered in the 2-hour session included the current electric generation portfolio and where that generation mix should be over the next 10 years. Participants were asked how they believe the current allocation of resources should change by 2025, with the understanding that all energy sources don't cost the same. Most expressed the view that Vectren South should begin switching from coal, expressing many concerns about quality of life. One respondent cited that we live in the dirtiest area in the U.S. for air pollutants and cancer rates due to coal power plants. Many believe Vectren South should be moving toward renewable energy sources, such as solar and wind and possibly hydro. Most believe it is important for Vectren South to diversify its power generation mix. Focus group respondents' ranked natural gas and wind/solar as "the best" options for Vectren South's future generation mix. Natural gas was cited as a happy medium between cost and less pollution, while renewable resources were noted as least damaging to the environment and worth the high up-front costs.

Multiple stakeholders and a number of individual customers also participated in Vectren South's IRP process in 2016, including the Sierra Club, Valley Watch and Citizens Action Coalition. Participating stakeholders were asked to develop two portfolios, which would then undergo the modeling process. In both cases, stakeholders chose portfolios with a significant percentage of renewable and energy efficiency resources demonstrating a desire to move from coal even though costs for these renewable-heavy portfolios are higher over the 20-year period. Details of those two options are below.

- Portfolio 1: In addition to 2% energy efficiency savings every year for 20 years, the portfolio included 200 MW of gas, 500 MW of solar and 800 MW of wind in

**Vectren South Responses to
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the first 10-year period with another 200 MW of wind, 100 MW of battery storage, 110 MW of natural gas and 400 MW of solar after 2030.

- Portfolio J: In addition to 2% energy efficiency savings every year for 20 years, the portfolio included 300 MW of gas, 800 MW of solar, 100 MW of battery storage and 1,200 MW of wind in the first 10-year period with another 100 MW of battery after 2030.

In 2017, Vectren conducted an online survey to gauge interest in a potential community solar program. The survey showed that customers generally find the concept of solar energy to be appealing.

In addition, Vectren regularly receives unsolicited feedback from customers via a quarterly study indicating a desire for renewable/solar energy.

Witness: Thomas L. Bailey

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Q 1.16: How much excess generation capacity will Vectren have once its new combined cycle gas turbine ("CCGT") generating facility is operational and the proposed unit retirements are effected?

Response:

Petitioner objects to the foregoing Data Request to the extent it asks Vectren South to conduct a study or prepare an analysis that does not presently exist. Subject to and without waiving the foregoing objection, Petitioner states as follows:

Currently, Vectren South's request for Commission authorization necessary to construct a new CCGT generating facility is still pending. Therefore, any response based on an assumed amount of capacity available from the CCGT would be speculative. Vectren South's request for Commission approval of upgrades to its Culley 3 coal-fired generating unit to comply with federal environmental regulations also is pending. Moreover, there are several unknowns that influence excess generating capacity. These include load growth, customer acceptance of energy efficiency and demand response initiatives, unit performance, MISO planning reserve margin requirements and the equipment manufacturer ultimately chosen to construct the CCGT unit. That said, based on the IRP assumptions, Vectren projects to have approximately 200MW's of excess capacity in 2025 and approximately 100MW's of excess capacity in 2036.

Witness: Wayne D. Games

**Vectren South Supplemental Responses to
OUCG Data Request Set No. 1
Cause No. 45086
Page 1**

Questions for Thomas Bailey:

- Q 1.23:** On page 4, line 26-28, of his Direct Testimony Mr. Bailey States that, "Vectren South has informed certain large customers regarding our plan to add renewable energy within Vectren South's electric utility footprint, including our ongoing solar projects."
- To what large customers is Mr. Bailey referring?
 - How much renewable energy (MWh) is expected to be added to Vectren South's footprint as a result of this project?
 - Mr. Games states at page 19, lines 5-7 of his Direct Testimony and Mr. Swiz states at page 6, lines 3-5 of his Direct Testimony that Vectren South plans to sell the Renewable Energy Certificates ("RECs") generated by this project. If Vectren sells, rather than retires, the RECs from this project, how will the renewable energy generated by this project assist with customers' environmental goals, as stated on pages 5 and 6 of Mr. Bailey's Direct Testimony?

Response:

- Vectren South met with several Large Power (LP) customers who are considered within Petitioner's Top 20 largest electric power users. In addition, Vectren South spoke to customers who have publicly stated renewable energy or sustainability goals. Vectren continues to receive informational requests from the current customer base as well as site selectors reviewing land options for new industrial customers. Since filing this proceeding, Vectren South has had two site selectors inquire as part of their RFI process whether the utility has solar assets and is willing to allow a prospective customer to enter into an agreement to purchase renewable energy generated by those assets. Another large customer recently contacted Vectren South and indicated they would like to discuss purchasing power from the proposed 50 MW solar project. This inquiry is in addition to the discussions Vectren South had with Toyota and AstraZeneca, which are described in the direct testimony of Thomas Bailey.
- Renewable energy expected to be generated by the projected on a monthly basis is 9-10M kWh. This is dependent on the time of year as well as weather conditions.
- As referenced in Mr. Bailey's testimony, certain customers have global renewable initiatives, which are published and include requirements for local manufacturing facilities to reduce their carbon footprint through the use of renewable energy. These policies also create an expectation that utilities will move toward diverse generation portfolio to assist corporations with their renewable goals. This project will assist with customers' environmental goals as it promotes increased reliance on energy resources that reduce CO₂ emissions and increase renewable use. The location of the project in Southwestern Indiana also provides assurance to customers that they are receiving a local source of renewable power. Regardless of REC disposition, CO₂ emissions will be reduced.

Witness: Thomas L. Bailey

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OUCC Data Request Set No. 1
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Q 1.24: Please refer to page 4, lines 30-32, of Mr. Bailey's Direct Testimony. Has Vectren informed this list of large customers that it intends to sell the RECs generated by the project to the market?

Response:

No. Vectren South had discussions with customers regarding the project. Vectren South did not discuss selling RECs to the market.

Witness: Thomas L. Bailey

Q 1.25: Please refer to page 5 of Mr. Bailey's Direct Testimony. Since the RECs generated from this project are to be sold, as stated by Mr. Games, will this project be a resource that satisfies the Principle of the Corporate Renewable Energy Buyers' Principles Group?

Response:

The Corporate Renewable Energy Buyers' Principles Group works to construct partnerships that provide greater choice in procuring renewable energy and access to new projects that reduce CO2 emissions. Additionally, the Corporate Renewable Energy Buyers' Principles Group, where possible, promotes procurement of renewable sources within reasonable proximity to manufacturing facilities. Accordingly, Vectren South's proposed project meets the principles of the Corporate Renewable Energy Buyers' Principles Group.

Witness: Thomas L. Bailey

REQUESTS
I. Data Requests

Q-2-1: Once this project is completed, what capacity credit will Vectren receive towards its generating reserve requirement at MISO?

Response:

MISO will give an unforced ("UCAP") capacity credit in accordance with the following:

4.2.3.4.1. Solar Capacity Credit

Solar photovoltaic (PV) resources will have their annual UCAP value determined based on the 3 year historical average output of the resource for hours ending 15, 16, and 17 EST for the most recent Summer months (June, July, and August). Market Participants will need to supply this historical data to MISO by October 31 of each year in order to have their UCAP value determined. Market Participants will use the template found on the MISO website (Planning > Resource Adequacy (Module E) > Planning Resource Auction) to submit the 3 year historical average output data. Solar PV resources that are new, upgraded or returning from extended outages shall submit all operating data for the prior Summer with a minimum of 30 consecutive days, in order to have their capacity registered with MISO. Resources with less than 30 days of metered values would receive the class average of 50% for its Initial Planning Year. Refer to Appendix V for additional examples.

Witness: Wayne D. Games

Q-2-4: On page 5, lines 15 through 18, of his Direct testimony, Mr. Games states, "Because the solar irradiance only meets the peak design condition during a small percentage of hours annually, the DC array is oversized to allow the inverter to operate at full capacity for a greater portion of the year, thereby providing more value for the capital expenditure."

- a. If the solar field output was not restricted by the inverter capacity, what would be the maximum output of the Solar Project in MW (AC)?
- b. If the solar field output was not restricted by the inverter capacity, what would be the estimated annual capacity factor of the Solar Project?
- c. By limiting the maximum output of the Solar Project to 50 MW (AC), how much energy production (MWh – AC) is foregone on an annual basis?
- d. Please provide the calculations that support Mr. Games' statement that undersizing the inverter provides more value when compared to the foregone energy production.

Response:

- a. The solar field output is not restricted by the inverter capacity. The AC inverters are sized to produce the desired name plate rated output of the solar field in MW AC which in this particular project is 50MW AC. The matching DC array is designed with a larger rating by necessity due to operational and system constraints such as inherent losses, operating temperature, irradiance, etc. The resulting DC:AC design ratio typically ranges from 1.2-1.4 as indicated in the response to OUCC Data Request 2.3. The larger DC array capacity allows for better control of the AC output and allows the field to meet its capacity rating for a greater percentage of the year.
- b. The solar field output is not restricted by the inverter capacity. See Vectren South's response to subpart a, above.
- c. None. The 50 MW AC capacity is the size constraint for interconnection and does not result in lost AC energy.
- d. The DC:AC ratio is not determined by a calculation, rather it is typically optimized by iterating various DC:AC ratios and comparing the resultant energy production to determine the DC:AC ratio which optimizes annual energy production. In the case of Petitioner's Solar Project, the physical land constraints limited the DC:AC ratio

Witness: Wayne D. Games

Q-2-5: Please refer to page 6 of Mr. Games' Direct Testimony.

- a. What was the price and term of agreement Orion offered when assessing Vectren's interest in a PPA? (Lines 5-6)
- b. Please provide the details of the local tax benefits secured by Orion and how the provisions that make them transferrable to Vectren. (Lines 30-32)

Response:

- a. No PPA price was offered by Orion. Once this on-system project was identified, Vectren South and Orion entered into discussion regarding possible ownership of the project.
- b. The terms of the tax abatement are as follows: the project will have 100% tax abatement in the first year of operation to be reduced by 10% per year (100%, 90%, 80%, etc.) over 10 years. The tax abatement from Spencer County classifies the Solar Project area as an "economic revitalization area." A copy of the Resolution classifying the area as an economic revitalization area was provided to the OUCC pursuant to an informal request. The abatement applies to the project in the zone created and is not specifically assigned to Orion, but to the project. Vectren South had local counsel review the Resolution adopted by Spencer County to ensure the abatement will transfer when Vectren South acquires the project from Orion.

Witness: Wayne D. Games

Q-2-6: Please refer to page 10 of Mr. Games' Direct Testimony, lines 30-32

- a. What is the expected life of the inverter?
- b. Is there a warranty on the inverter?
- c. What is the estimated cost of the inverter?
- d. If the inverter were to fail, will the Solar Project cease to deliver power to the interconnection?
- e. If the inverter were to fail and require replacement, what is the expected time to obtain a replacement?
- f. Please provide the calculations that address the trade-off between fewer component connections and future O&M of a central inverter with the lost production in the event of an inverter failure compared to a risk mitigation strategy involving multiple inverters.

Response:

- a. With regular maintenance industrial grade central inverters have a 30-year expected design life.
- b. Yes; the standard warranty offering is 5 years.
- c. Because of the layout of the facility there will be different sizes of central inverters (1-3MW's) so there is not one answer on inverter costs. Estimated cost of a new inverter is currently \$0.04 - \$0.06/Watt/dc. Normal practice is to purchase a Power Conversion Station (PCS) that includes an inverter, step-up transformer and vault for terminating cabling. A PCS is estimated to cost \$0.06- \$0.08/Watt/dc.
- d. No. If an individual central inverter (1-3MW's) failed the other inverters on the site will continue to function and export power. The power plant controller will compensate for the off-line inverter by increasing capacity, if available, from the other inverters to close the gap. This is a benefit of the 1.2 DC:AC ratio design approach used.
- e. Under most conditions, repairs are done within 48 hours for common component failures. Major component failures may take 1 to 2 weeks depending on parts availability.
- f. String inverters are sized at 25-250kW/dc where a central inverter is sized at 1-3MW/dc. Approximately 20-25 central inverters will be needed for this project. If Vectren South were to choose string inverters primarily used in residential and commercial applications there would 500-600 inverters. Connections and maintenance of a string inverter system on a project this size is impractical due to the number of inverters and connections. Thus, the use of central inverters was a design criteria chosen for the project. When string inverters fail they are normally disposed of and replaced with a new component. First Solar has advised that by keeping adequate spare parts and performing preventive maintenance, use of central inverters on a project this size is more economical. Although

Q-2-7: Please refer to page 13 of Mr. Games' Direct Testimony, lines 29-32

- a. Does Mr. Games agree that the projects to which he refers are significantly smaller than the Solar Project proposed by Vectren?
- b. Do any of the projects to which Mr. Games refers utilize a single inverter?
- c. Do any of the projects to which Mr. Games refers utilize single axis tracking?

Response:

- a. Yes.
- b. Vectren South has not studied these projects and merely was referencing the cost for reference purposes.
- c. See Vectren South's response to subpart b, above.

Witness: Wayne D. Games

Q 3.3: Similar to the pie charts shown on page 15 of Mr. Games's direct testimony, please provide data for the energy (MWh) for 2015 actually generated by source and the projected energy generated by source (MWh) for the 2036 Preferred Portfolio Resource Mix.

Response:

The information below is based on total generation to serve Vectren customers and wholesale energy sales.

	2015 Actual	2036 Projected
Natural Gas Baseload (MWh)	0	5,298,846
Natural Gas Peaking (MWh)	42,764	686,099
Renewable (MWh)	232,411	294,684
Coal Base Load (MWh)	4,969,519	1,557,829
Total	5,244,693	7,837,458

Witness:

Wayne D. Games

Q 3.4: What is the total amount of land under lease in acres for the proposed project?

Response:

Orion's practice is to lease each landowner's entire property, except for agreed exclusion areas. According to Orion, there are 1,043 acres under lease. Orion then investigates constraints such as zoning setbacks, wetlands, flood plains and endangered species. Orion also seeks permits, crossing agreements and an interconnection agreement. During this due diligence period, Orion pays the landowner initial rent on each acre of the entire property and the landowner is free to continue using the property for its current uses, such as farming.

Once Orion understands any constraints and obtains necessary permits, approvals and crossing agreements, it designates the area suitable for the solar project. Under the lease, notice is given to the landowner of the suitable area at the time of the notice of commencement of construction. The solar project owner will pay the landowner operational rent payments for acreage that will be part of the solar project, which is estimated to be approximately 300 acres.

Once Vectren receives approval to move forward with the project, the leases will be transferred from Orion to Vectren and Vectren will have Orion's rights under the leases. .

Witness:

Wayne D. Games

Q 3.7: Please refer to VSE's response to OUC DR 2-4:

- a. Mr. Games states at page 5 of his direct testimony that the DC capacity of the Solar Project is 64 MWdc. If there were more than 64 MW of AC inverter capacity, what would be the peak output of the Solar Project in MW (AC)?
- b. Mr. Games states in his direct testimony at page 11 that this project received approval to interconnect up to 70 MWac into the MISO transmission system. VSE's response to 2-3 (c) states that "The 50 MW AV capacity is the size constraint for interconnection and does not result in lost energy." Please explain why 50 MW is a constraint for interconnection if MISO approved up to 70 MW.
- c. Please refer to the article at the following website: https://new.abb.com/docs/librariesprovider117/default-document-library/solar-inverters/solar_power_world-article.pdf?sfvrsn=80a7614_4. The article discusses "inverter clipping" and how it results in energy lost for solar power arrays. For the Solar Project, what is the estimate of energy lost on an annual basis?
- d. In the response to OUC DR 2-4 (d), you state there are no calculations. Please provide documentation of the "iterations" of various DC:AC ratios that optimizes annual energy production.

Response:

- a. The peak instantaneous output of the project in MW (AC) would be equal to the AC Inverter capacity, less collection lines and transformer conversion losses, to the point of interconnection. However, the annual energy production would not increase but the capital cost of the project would increase. Thus, the \$/kWh would be higher than a comparable project with a higher DC:AC ratio.
- b. MISO has cleared the request through Phase I of the approval process to interconnect up to 70MW AC. However, the developer has not been able to secure sufficient land leases to support a 70 MW AC project therefore limiting the overall output to its current size.
- c. Plant Predict was used to calculate energy production for the project based on input assumptions for panel type, inverter type, DC:AC ratio, useable acres, ground coverage ratio, solar panel degradation, and tracking versus fixed tilt. Daily solar production follows a "bell curve" shape. Inverter clipping occurs when the instantaneous output of the DC system meets or exceeds the nameplate rating of the inverter. The DC system output will be able to exceed the inverter nameplate rating when the ambient conditions are near standard test conditions (1,000 W/m² coincident with moderate temperatures near 70°F). When the inverter is clipping, there are theoretical losses in energy production. Those losses estimated to be 1.6 GWh AC in year one for the Solar Project, which based on a total of 109.2 GWh AC produced equates to approximately 1.4% per year.

The referenced article does not address the gains from increasing the DC:AC ratio occurring during the ramp up and ramp down periods of the day which

Q 3.8: Follow up to VSE response to OUC DR 2-5:

a. Did VSE request indicative price and terms of Orion? If not, why not?

Response:

No. As stated in Mr. Games' testimony, Orion presented Vectren with an on-system project of a scale that presented a unique and timely opportunity to add a significant renewable resource to the generation portfolio. The project was timely from the perspective that it could be developed in a timeframe to maximize tax incentives, fit well within the IRP preferred plan and provided a response to the trend in large customer policies that their utility should be able to demonstrate reliance on renewable resources as part of the portfolio to mitigate carbon emissions. From the outset there was mutual interest in Vectren purchasing the project to obtain this renewable resource. From Vectren's perspective, ownership of the project provides control over its entire useful life which could exceed 30 years. For example, Vectren could decide during the life to modify technology at this excellent site. Moreover, by owning the facility, certain risks such as the long term financial strength of a non-regulated provider and the corresponding need to obtain some form of security were removed from consideration. From the outset, Orion provided its project cost estimates that established the basis for the negotiation of purchase terms. As discussions ensued the timely ability to lock in panel pricing to control costs also became a positive factor.

Witness:

Wayne D. Games

Q 3.9: Follow up to VSE response to OUCC DR 2-6:

- a. What is the expected life of the inverter(s) proposed for the Solar Project?
- b. Please provide documentation that supports your answer to (a.) above.
- c. What is the expected life of a central inverter, as proposed for the Solar Project, that the industry commonly expects?

Response:

- a. Although Vectren reserves the right to select the inverter manufacturer and model during final design of the Solar Project, Vectren intends to select a product manufactured by a company with a track record of supplying utility-scale solar inverters to the US market. Such companies include SMA and Power Electronics, which indicate a design life of 25 to 30 years for their products.
- b. See the following resources:

http://www.downloads.power-electronics.com/15%20FREESUN/01%20CATALOGOS/Solar_brochure_20180615_def.pdf Page 17

<https://www.sma-america.com/products/medium-voltage-transformers/medium-voltage-block-1850-us-20-2200-us-20-2500-us-20-2750-us-20.html>
- c. With proper maintenance, it is assumed utility-scale inverters will continue to operate for their design life of 25 to 30 years.

Witness:

Mathew R. Brinkman

Vectren South Responses to
OUCC Data Request Set No. 3
Cause No. 45086
Page 14

Questions for Thomas Bailey

Q 3.11: Please provide the annual electrical energy consumption (MWh) by Vectren customer Astra-Zeneca for 2016 and 2017.

Response:

Petitioner objects to the foregoing Data Request on the grounds that it seeks information that Petitioner's customer may consider to be confidential and proprietary. Large customers frequently request that Petitioner keep information regarding their usage and billings confidential as such information can be used to their competitive detriment. Subject to and without waiving the foregoing objection and pursuant to the terms of the Nondisclosure Agreement entered into between Petitioner and the OUCC, Petitioner states that the annual electrical energy consumption(s) for Astra Zeneca is as follows:

2016	—	██████████	MWh
2017	—	██████████	MWh

Witness:

Thomas L. Bailey

Q 3.12: Of the several customers listed in your testimony at page 4, what are their goals by year for obtaining renewable energy?

Response:

Petitioner objects to the foregoing Data Request on the grounds that it is overly broad and unduly burdensome to the extent it is intended to seek through Petitioner information from third parties. Petitioner also objects to the extent the Data Request call for speculation. Subject to and without waiving the foregoing objections, Petitioner submits the following response.

As indicated in the testimony of Mr. Bailey, the customers listed on page 4 are supporters of Vectren's proposed Solar Project, in part because they have adopted corporate policies in support of renewable energy. Whether or not they have internal goals that dictate year-by-year progress on such goals has not been shared with Vectren.

Witness:

Thomas L. Bailey

Questions for Cas Swiz:

Q 3.13: Confidential Attachment JCS-1 shows that less than 100% of the project is eligible for the ITC. Please explain what components are not eligible and why.

Response:

Per Internal Revenue Code Section 48 and accompanying Regulations, solar property qualifying for the Investment Tax Credit includes equipment and materials, as well as parts related to the functioning of such equipment that use solar energy directly to: (i) generate electricity, (ii) heat or cool a building or structure, and/or (iii) provide hot water for use within a building or structure. In accordance with the foregoing, components not eligible include costs to upgrade the grid network and the generation tie-in to the Hoosier substation. In addition, about of 10% of the balance of plant construction costs are assumed to not qualify. Land costs also are not eligible. However, since Vectren is leasing the land, land cost did not figure into the referenced calculation.

It is important to note that the amounts reflected in Attachment JCS-1 are estimates based on preliminary capital estimates. At the point when the investments are completed, Vectren's Corporate Tax department will assess the investments made in accordance with Internal Revenue Code requirements to ensure only those eligible for the ITC are captured.

Witness:

J. Cas Swiz

Q 3.14: Is this project eligible for accelerated depreciation for tax purposes?

- a. If so, what method will Vectren utilize?
- b. Please reference the portion of the Federal tax code that permits or disallows this treatment for tax purposes.

Response:

Yes, this project is eligible for accelerated depreciation for tax purposes.

- a. Vectren will employ the accelerated cost recovery system methodology delineated in Internal Revenue Code Section 168 to calculate the annual accelerated depreciation amounts for tax purposes.
- b. Section 13201(d)(9)(A) of Public Law 115-97 (commonly referred to as the "Tax Cuts and Jobs Act", or "TCJA"), signed into law on December 22, 2017, excludes regulated public utility property from eligibility for bonus depreciation. Consequently, the assets associated with this project are not eligible for the bonus depreciation percentages specified in TCJA Section 13201(a)(2).

Witness:

N/A

Q 3.15: For tax purposes, will Vectren take the full ITC in the first year or will Vectren take 1/30th of the amount each year for 30 years as modelled in Confidential Attachment JCS-1? Please cite the relevant code or regulation supporting Vectren's answer.

Response

Vectren will normalize and amortize the ITC amount over the useful life of the property as modeled in Confidential Attachment JCS-1.

The Revenue Act of 1971 added Section 46(e) to the Internal Revenue Code as it existed at that point in time. Section 46(e) provides regulated public utilities the ability to make one-time irrevocable elections regarding the treatment of ITC balances for ratemaking purposes. Vectren continues to be bound by a previously-made election under this provision to normalize and amortize ITC balances over the useful lives of any and all property to which ITCs apply in performing its cost of service calculations.

Witness:

J. Cas Swiz

Q 3.16: Please provide calculations that support Vectren's estimate of the rate increase as a result of this project for :

- a. The percent energy rate increase for a typical residential customer;
- b. The total rate increase for a typical residential customer; and
- c. The total rate increase for a typical small commercial customer.

Response:

Please see the excel spreadsheet provided to the counsel for the OUC by e-mail dated May 9, 2018 for the calculation of the illustrative rates.

- a. The percentage rate increase for a typical residential customer would be dependent on the electric rates at the time the project goes into service. However, Vectren estimates that the rate increase for a typical Residential customer using 1,000 kWh per month would be between 1% and 2% using the illustrative rates set forth in Attachment JCS-1.
- b. The illustrative total rate increase for a typical Residential customer using 1,000 kWh per month would be approximately \$2.75 per month.
- c. The illustrative total rate increase for a typical Small General Service (SGS) customer using an average of 550 kWh per month would be \$1.40 per month.

Witness:

J. Cas Swiz

- Q 3.22:** If Vectren sells the Solar Renewable Energy Credits ("SRECs") generated by the solar facility, has it determined to which REC markets it could sell such RECs?
- a. Please list all potential markets to which the SRECs could be sold.
 - b. Please indicate the current market price for SRECs in each market provided in (a).
 - c. Please indicate how Vectren intends to comply with Federal Trade Commission ("FTC") regulations regarding the communication of green power supply to its customers if the company sells the SRECs generated in the market.

Response:

- a. A solar farm located in Vectren's territory (MISO Indiana) would qualify for the voluntary REC market as well as for Ohio SREC Renewable Portfolio Standard (RPS) market.
- b. Voluntary REC market currently ranges in price from \$1.00-\$1.25/REC while the Ohio SREC RPS market ranges in price from \$10.00-\$15.00/REC.
- c. Vectren intends to comply with Federal Trade Commission Regulations. To that end, Vectren understands it could potentially sell RECs, credit the revenue back to customers and still represent that a portion of the generation fleet is a renewable source.

Witness:

Wayne D. Games

Question of Wayne Games:

- Q 4.2.** As referenced in the 2016 IRP filing, 50 MW of solar generation was planned to be part of Petitioner's resource mix by 2019.
- Why didn't Vectren recognize this opportunity for a solar grid installation before Orion began procuring leases for land within Vectren's service territory in mid-2017? (pg. 5 of 45086 Petitioner's Exhibit No.1, Testimony of Wayne Games).
 - When did Orion approach Vectren with the opportunity for the solar project? Was this prior to Vectren's 2016 IRP filing?
 - According to pg. 6 of Wayne Games' Testimony, Vectren was independently considering construction of a large scale solar facility. Were any other locations evaluated for potential solar grid installations to meet this resource planning goal? If so, can you explain why these alternative locations were not identified as comparative options in this petition? Provide copies of all of Petitioner's records and other documentation concerning any other sites considered for the proposed solar facility.
 - Were any alternative options considered for meeting Petitioner's 2016 IRP goal of adding 50 MW of solar generation resources by 2019?

Response:

- Vectren South was focused on areas within its customer service territory larger than 150 acres, within 3 miles of a transmission substation and that met the following criteria:
 - Wetlands less than or equal to 10% of parcel area.
 - Floodplain less than or equal to 30% of parcel area.
 - Minimal woodlands or forested area of parcel.
 - 80% of the site being "3% or flatter slope", or 60% or more of the site being generally south-facing aspect.

The Orion site was not identified in this search as it didn't meet these criteria.

- Orion approached Vectren South in the spring of 2017 which was after Vectren South's IRP filing in December of 2016.
- Vectren South hired Lochmueller Group, a civil engineering firm in Evansville Indiana, to conduct a property search based on the criteria listed in response to subpart (a). Lochmueller recommended seven properties for consideration. Vectren South was in the process of conducting a market analysis through Dave Mathews and Associates and had not yet contacted property owners when discussions with Orion and First Solar progressed to the point where Vectren South's external consultant advised that we had a very competitive offer considering potential tariffs and impact on solar panel prices. At this point Vectren South also recognized that getting a project through the MISO

interconnect approval process would take up to two years and create challenges for Vectren South to take advantage of the 30% Investment Tax Credit, which requires starting a project in 2019. Orion had entered the project in the MISO queue in late 2016 and secured a local tax benefit through the solar farm being designated as an Economic Revitalization Area. As a result of these factors Vectren South put contacting property owners on hold and completed negotiations with Orion and First Solar. OUCC Attachment 4.2 shows the seven properties being considered.

- d. Yes. Vectren South also explored adding several smaller sites on the distribution systems totaling 50MW's but quickly realized land leases and system interconnect costs for numerous sites drove cost higher than a single site on the transmission system.

Witness:

Wayne D. Games



NEXT GENERATION SUSTAINABILITY

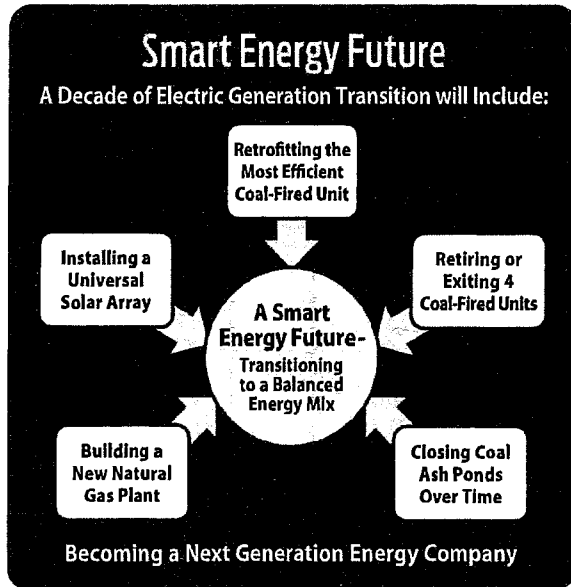
2017 Vectren Corporation Sustainability Report



VECTREN
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GENERATION TRANSITION



Vectren's Solar Projects

Not only is Vectren upgrading its electric system, but we are also continuing our path toward a balanced energy mix with universal solar projects. Vectren will partner with First Solar, Inc. to build a 50-megawatts (MW) solar array that will be situated on approximately 300 acres and will consist of about 150,000 solar panels. The array will be mounted on a single-axis tracking system, which enables the panels to automatically pivot to enhance energy generation as the sun's rays move across the surface of the Earth. The facility, which should be operational in the fall of 2020, is expected to generate enough power to meet the needs of more than 11,000 households per year. The project will provide up to 250 jobs at its peak, many of which will be union labor. Construction will begin after the Indiana Utility Regulatory Commission authorizes the project; a decision is expected in the first half of 2019. "This significant renewable resource will be connected to our system to serve our local customers, which will bring one of the largest single-sited solar farms in the Midwest to southern Indiana," said Chapman.

Vectren Planned Solar Projects:

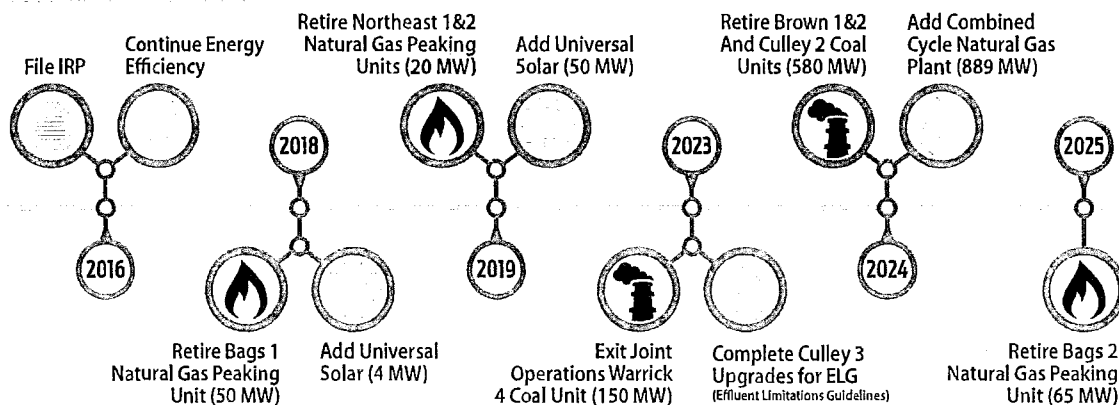
- **50MW Utility-Scale Solar Array** Built in Spencer County, Indiana
- **(2) 2MW Projects** that will be built in 2018, one near Highway 41 in Evansville, Indiana and the second near Oakhill Cemetery in Evansville, Indiana. These two combined will supply enough renewable energy to power 600 homes each year.

Vectren's Planning Process

In 2016, Vectren completed an extensive year-long integrated resource planning process, which considered a broad range of potential resources and variables to ensure the plan offered a long-term reliable and reasonably priced generation portfolio as well as a balanced energy mix. In arriving at a preferred generation portfolio we considered the costs to continue operating our existing coal-fired generation units in a manner that complies with current and anticipated future environmental requirements, as well as various resource alternatives, such as the use

of energy efficiency programs and renewable resources as part of the overall generation portfolio. The Company received robust stakeholder participation and feedback, holding three public stakeholder meetings. Vectren's generation transition plan was presented to the public in November 2016 and includes the retirement of A.B. Brown Units 1 & 2, F.B. Culley Unit 2 and exiting joint operations of Warrick Unit 4 with Alcoa, the construction of a new natural gas-fired combined cycle unit and the addition of 54 megawatts of solar by 2025.

Generation Transition Plan



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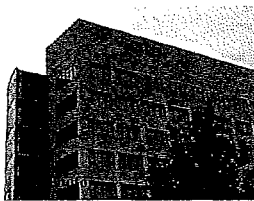
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Vectren announces site for new solar farm

John Martin, Courier & Press Published 10:17 a.m. CT March 13, 2018 | Updated 1:22 p.m. CT March 13, 2018



(Photo: John Martin, Courier & Press)

EVANSVILLE, Ind. -- Vectren announced Tuesday that its new 50-megawatt solar farm will be built in Spencer County.

The solar array will be situated on approximately 300 acres near Troy, Ind., and will consist of about 150,000 solar panels.

The array will be mounted on a single-axis tracking system, which enables the panels to automatically pivot to enhance energy generation as the sun's rays move across the surface of the Earth, according to Vectren.

Vectren said the facility, which should be fully operational in the fall of 2020, is expected to generate enough power to meet the needs of more than 11,000 households per year.

First Solar Inc. will build the solar farm, which is estimated to cost \$70 million to \$75 million.

It is part of Vectren's long-term electric generation transition plan, announced last month. That plan also calls for construction of a \$900 million natural gas plant in Posey County.

The Evansville-based utility worked with Orion Renewable Power Resources, a joint venture between Orion Renewable Energy Group and MAP Renewable Energy, to select, secure and eventually develop the Spencer County property.

"This significant renewable resource will be connected to our system to serve our local customers," said Carl Chapman, chairman, president and CEO of Vectren, in a news release. "We are confident First Solar and Orion are the right partners for this scale of a project, which will bring one of the largest single-site solar farms in the Midwest to southern Indiana."

Construction will begin after the Indiana Utility Regulatory Commission authorizes the project, Vectren officials said. A decision is expected in the first half 2019.

More: [Vectren: Natural gas plant, solar farm to join energy production \(/story/news/2018/02/20/vectren-natural-gas-plant-solar-farm-join-energy/356818002/\)](http://www.courierpress.com/story/news/2018/02/20/vectren-natural-gas-plant-solar-farm-join-energy/356818002/)

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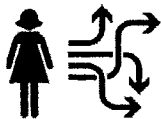
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CORPORATE RENEWABLE ENERGY BUYERS' PRINCIPLES ([HTTPS://BUYERSPRINCIPLES.ORG](https://buyersprinciples.org))

The Principles

The Corporate Renewable Energy Buyers' Principles tell utilities and other suppliers what industry-leading, multinational companies are looking for when buying renewable energy from the grid. A group of large energy buyers developed these six principles to spur progress on renewable energy and to add their perspective to the future of the U.S. energy and electricity system.

The Buyers' Principles outline six criteria that would significantly help companies meet their ambitious purchasing goals:



CHOICE

1. Greater choice in procurement options,

It is important to have choice when selecting energy suppliers and products to meet our business and public goals.



COST-COMPETITIVENESS

2. More access to cost competitive options,

We know renewable energy can already achieve cost parity, or better, compared with traditional energy rates. When purchasing renewable energy directly, we would like to be able to buy renewable energy that accurately reflects the comprehensive costs and benefits to the system. Many of us are willing to explore alternative contract arrangements (e.g., entering into long term supply arrangements with utilities and other suppliers to provide revenue certainty) that can bring down the cost of capital.



LONG-TERM PRICING

3. Longer- and variable-term contracts,

A significant part of the value to us from renewable energy is the ability to lock in energy price certainty and avoid fuel price volatility. Many companies would like to have options for entering into contracts over various time periods.



NEW PROJECTS

4. Access to new projects that reduce emissions beyond business as usual,

We would like our efforts to result in new renewable power generation. Pursuant to our desire to promote new projects, ensure our purchases add new capacity to the system, and that we buy the most cost-competitive renewable energy products, we seek the following:

Access to bundled renewable energy products— energy and Renewable Energy Credits (RECs)

- We are increasingly interested in access to bundled energy and REC products. Unbundled RECs do not deliver the same value and impact as directly procured renewable energy from a specific project or facility.

Ability to prevent double counting within the energy consumer community

- In order to claim the benefits of our renewable energy purchases to satisfy our public goals and reduce our carbon footprint, current US rules require that we retain ownership of the RECs or that they are retired on our behalf. Some companies find this single-instrument system creates competition between energy generators and energy users that can slow the growth of voluntary corporate renewable purchases. We welcome discussion to explore market mechanisms that enable greater voluntary growth of renewable energy while maintaining accounting integrity. What is most critical to us is that we have the ability to add more renewable energy to the system and claim the consumption of the relevant renewable energy and GHG emission benefits while preventing another energy user from claiming consumption of the same renewable energy.

Renewable energy delivery from sources that are within reasonable proximity to our facilities

- Where possible, we would like to procure renewable energy from projects near our operations and/or on the regional energy grids that supply our facilities so our efforts benefit local economies and communities as well as enhance the resilience and security of the local grid.



FINANCING TOOLS

5. Increased access to third-party financing vehicles as well as standardized and simplified processes, contracts and financing for renewable energy projects

To access renewable energy at the competitive prices and scale we need to meet our goals, many companies are financing and/or procuring renewable energy through third-party providers using power purchase agreements (PPAs) and/or lease arrangements. Increasing access to these types of effective and affordable financing tools is critical. Initially, for some companies, these processes can be complex and costly since they are outside of their core business functions. Simplifying and standardizing policies, permitting, incentives and other processes for direct procurement are high priorities for many companies.



COOPERATION

6. Opportunities to work with utilities and regulators to expand our choices for buying renewable energy

Procuring renewable energy in partnership with our local utilities may be a more efficient and cost-effective option. We welcome the opportunity to work with local utilities to design and develop innovative programs and products that meet our needs as well as those of our energy suppliers. In such collaborations, we would seek renewable energy products and programs that address the above principles and that

Fairly share the costs and benefits of renewable energy procurement

- We seek to purchase renewable energy that reflects the net costs and benefits to the system, including the actual cost of procurement and benefits, such as, but not limited to, avoided energy and capacity benefits, without impacting other rate payers.

Apply to new and existing load

- To meet our public goals, we need renewable energy for both new and existing operations.

[Join Us \(/join-us\)](#)

Featured Resources

Corporate Renewable Energy Buyers' Principles

A collaboration of leading companies seeking simplified access to the renewable electricity they need to meet their clean and low carbon energy goals. The project is facilitated by World Resources Institute and World Wildlife Fund.

Contact

info@buyersprinciples.org ([mailto:info@buyersprinciples.org?subject=Corporate Renewable Energy Buyers' Principles Info Request](mailto:info@buyersprinciples.org?subject=Corporate%20Renewable%20Energy%20Buyers'%20Principles%20Info%20Request))

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[energy\)](#)

<http://www.wri.org/our-work/topics/energy>

Hoosier Energy

A coal-fired Integrated Gasification Combined Cycle unit with Carbon Capture Sequestration (IGCC w/CCS) may be a viable supply-side resource option. An IGCC uses a gasifier to convert coal to syngas and then removes impurities from the syngas before it is combusted. This results in lower emissions of sulfur dioxide, particulates, and mercury. With additional process equipment, the carbon in the syngas can be shifted to hydrogen via the water-gas shift reaction, resulting in nearly carbon free fuel. The resulting carbon dioxide from the shift reaction can be compressed and stored. Excess heat from the primary combustion and syngas fired generation is then passed to a steam cycle, similar to a combined cycle gas turbine. This results in improved efficiency compared to conventional pulverized coal.

The economics of IGCC versus natural gas combined cycle is highly dependent upon the price of coal versus natural gas. In general, given the current abundance of domestic natural gas, resulting prices and forecast of similar expectations in the future, the higher capital and operational costs associated with IGCC technology are difficult to justify.

4.3.6 Wind Generation

Energy from wind resources has become a prominent component of most resource plans as cost reductions due to technology improvements allow wind to be more competitive. The problem with wind generation remains the intermittent nature of the resource, which means the value is significantly lower due to the intermittent and unpredictable nature. Another hurdle for wind resources is the availability and expense of sufficient transmission infrastructure to move the wind energy from producing regions to load centers.

The installed cost of wind ranges from \$1,500 - \$2,300 per kW, depending upon the size of the installation.⁹ For purposes of the IRP, a 100 MW Wind PPA was used as a proxy to model wind generation. The assumed PPA has a 20-year term with an energy cost of \$35/MWh in 2018 dollars, escalated based upon the annual escalation factor found in the NREL's 2016 Annual Technology Baseline. The initial cost assumption is based upon recent prices for Indiana/Illinois wind generation during the past 12–24 months.

4.3.7 Solar Generation

Due to decreasing costs of photovoltaic panels, solar energy generation is becoming more economically competitive relative to other supply-side resources. The intermittent nature of solar generation tends to limit its value unless paired with energy storage. The cost for generating solar power through a utility-scale program is significantly less per kilowatt hour when compared with individual, smaller scale systems.

The installed cost of Solar PV ranges from \$1,600 - \$2,000 per kW for a utility-scale PV installation to \$5,000 - \$7,500 per kW for a Concentrating Solar Power installation including storage⁹. For purposes of the IRP, a 200 MW Solar PPA was used as a proxy to model solar generation. This PPA has a 20-year term and used an energy rate of \$36/MWh in 2018 dollars and was escalated based upon the annual escalation factor provided by NREL's 2016 Annual Technology Baseline. The initial cost assumption for the Solar PPA was based upon recent price quotes for Indiana and surrounding states during the past 12–24 months.

⁹ National Renewable Energy Laboratory – 2016 Annual Technology Baseline

Hoosier Energy

4.3.8 Renewable Resources

Other resources considered renewable are technologies fueled by landfill gas, coalbed methane and biomass. These technologies can be promising as continued technological advances increase efficiencies and experience reduces the development and operating risk. However, in order to be cost effective versus other resources, these technologies generally require a specific need, such as a requirement to find an alternate method to dispose of waste. In addition, in order to be cost competitive these technologies generally require a sufficient, reliable and economically advantageous fuel source.

Other alternative energy projects, such as cogeneration and coal waste technologies, may or may not qualify as renewable energy but could prove economic and provide supply-side diversification. Hoosier Energy has analyzed a number of these proposals and has demonstrated a commitment to considering all economically viable renewable energy resources.

The Hoosier Energy Board of Directors adopted a Renewable Energy Program (Board Policy 5-2) that defines targets and evaluation criteria for renewable projects. As originally adopted, Hoosier Energy's policy sets a goal to secure 2% of total energy generated from renewable resources by 2011 with additional resources going forward matching 5% of member energy growth. As Hoosier Energy has met the initial policy goal, the policy was revised in 2014 to set a target of obtaining 10% of member energy requirements from renewable resources by 2025. The prospective addition of a 200 MW Solar PPA beginning in 2020 will achieve the 10% by 2025 renewable energy target.

4.3.9 Distributed Generation

Options for distributed generation include both fossil and renewable sources. On the fossil side, the cost of distributed generating capacity for diesel or gas turbines is estimated to be greater than \$1,000 per kW. The actual cost is highly dependent upon a number of factors, including the type of engine (diesel reciprocating engine or gas turbine), size, manufacturer, emission level, efficiency, etc. Given the higher capital cost, the economics of distributed generation does not compare favorably to central station power without a customer specific need for increased reliability and/or an economically advantageous fuel source.

Hoosier Energy's Member systems have 256 distributed solar and 24 distributed wind generation customers. These customers installations have a nameplate capacity of 2.2MW of solar and 0.1MW of wind. Hoosier Energy and its Members have adopted a consistent compensation mechanism applicable to all installations of less than 50kW. The rate is based upon Hoosier Energy's projected variable production cost from the G&T's Budget and provided to the members in October for the upcoming budget year.

For customer-owned generation qualifying facilities greater than 50kW (and less than 20MW), Hoosier Energy and its Member Cooperatives have adopted a policy that requires excess energy to be purchased by Hoosier Energy under Schedule CPP. Schedule CPP is consistent with the IURC's QF rules and includes the following compensation amounts:

If the qualifying facility meets the requirements of Schedule CPP, Hoosier Energy will purchase energy at the following rates:

For all on-peak energy supplied	\$0.03951 per kWh
For all off-peak energy supplied	\$0.02694 per kWh.

Hoosier Energy

3.1.2 Power Purchases

In addition to owned generation resources, Hoosier Energy uses a mix of long-term and short-term power purchases to provide reliable and least-cost service to member systems.

Hoosier Energy purchases 150 MW from Duke Energy Indiana under two separate, cost-based, long-term purchase agreements. The first agreement is for 100 MW and runs through 2023, while the second agreement is for 50 MW and runs through 2025. Both agreements contain load factor requirements that qualify them as baseload generation resources. These purchases provide better diversity and less operating risk characteristics than an owned resource.

Hoosier Energy also purchases capacity, energy and renewable energy credits from renewable resources through a number of purchased power agreements. Renewable generation includes wind, hydro, solar and biomass facilities that do not rely on traditional fossil fuels.

The Story County wind project is a 150 MW wind farm developed by FPL Energy, which became operational in November of 2008. Hoosier Energy has rights to 25 MW through a 10-year agreement for energy, capacity, and renewable energy credits. Hoosier Energy is participating in conjunction with other cooperatives with coordination provided by ACES.

A 20-year purchased power agreement was finalized in 2012 for electricity produced by the Dayton Hydro facility. This project is a 3.6 MW hydroelectric facility near Dayton, IL. The plant produces about 18,000 megawatt-hours annually, enough to power about 1,500 homes.

The Rail Splitter facility is a 100 MW merchant facility built in 2009 and located near Lincoln, Illinois. In 2014, Hoosier Energy entered into a 15-year agreement with EDP Renewables to purchase 25 MW from the facility. Energy purchases under the PPA began in December 2014 and continue through the end of 2029. In addition to capacity and renewable energy credits, Hoosier Energy receives approximately 70,000 MWh of energy annually from the facility.

In November 2015, Hoosier Energy's Board approved a PPA with developer EDP on a wind project in White County in northwest Indiana. The PPA includes the purchase of 75 MW from the Meadow Lake V project. The Meadow Lake V project represents an expansion of the existing 500 MW wind farm that has been in service for a number of years. Hoosier Energy will purchase 25 MW starting in January 2018 for a 20-year term and an additional 50 MW beginning in January 2020 for a 20-year term. A 38% capacity factor is anticipated.

In November 2017, Hoosier Energy's Board approved a Resolution authorizing a long term PPA for energy and capacity from a 200 MW solar array. The array will be built in Hoosier Energy's service territory and interconnected to the PJM regional transmission organization. The PPA calls for 100 MW and 205,000 MWh annually beginning January 1, 2020 with an additional 100MW and 205,000 MWh beginning January 1, 2021. The 20-year PPA extends through December 31, 2039. The energy price is fixed throughout the term. In addition, Hoosier Energy will receive Renewable Energy Credits (RECs) as part of this transaction. No capital investment will be required by Hoosier Energy. The agreement also protects Hoosier Energy from exposure to negative LMP prices and includes provisions guaranteeing delivery of 75% of expected annual energy from the array. However, the possibility of a federal tariff on imported solar panels could jeopardize the PPA.

Overall Summary and Pricing Received

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

Preliminary – Subject to Due Diligence

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Trump Tariffs on Chinese Solar and Battery Products to Have Minimal Impact

With Chinese solar imports already flagging, new tariffs shouldn't further damage the industry.

EMMA FOEHRINGER MERCHANT

JUNE 19, 2018



Analysts don't expect the solar or storage industries to take a heavy hit from recent Trump tariff announcements.

Photo Credit: Shutterstock

A Monday announcement that the Trump administration would consider adding a 10 percent tariff on \$200 billion worth of Chinese goods has journalists, industry and political commentators crying "trade war." (<https://www.cnbc.com/2018/06/18/us-china-trade-war-fears-rise-after-trumps-new-tariffs.html>)

Over the past week the Trump administration and the Chinese government have traded promises (<http://www.chicagotribune.com/news/nationworld/ct-trump-tariffs-china-20180618-story.html>) of new and greater tariffs on an array of goods. Some solar and battery products were included in an announcement last week of a 25 percent tariff on \$50 billion in Chinese products, but thus far any impact on the clean technology industry looks to be a soft blow.

Ironically, the trauma from Section 201 solar tariffs (<https://www.greentechmedia.com/articles/tag/section-201>) stacked on top of existing anti-dumping and countervailing duties has blunted any further impact of tariffs on Chinese imports.

"A lot of manufacturers built up capacity in other regions, primarily in Southeast Asia, basically so they could avoid importing cells and modules from China specifically," said MJ Shiao, head of Americas at GTM Research. "China is an increasingly small portion of imports and, with Section 201 in place, it pretty much killed prospects for anyone competitively importing from China to the U.S."

According to data from the U.S. International Trade Commission, the dollar value of imports of Chinese solar cells assembled into modules or panels has decreased 66.8 percent between 2017 and 2018 to-date. While the dollar value of Chinese cells not assembled into modules or panels has increased this year, Chinese imports are still only valued at \$280,000 — a total of 1 to 2 megawatts — so far in 2018.

The administration announced a 30 percent step-down (<https://www.greentechmedia.com/articles/read/breaking-trump-admin-issues-a-30-solar-tariff#gs.5znuFEM>) Section 201 tariffs on imported solar cells and modules in January.

For battery storage, the products included in the latest tariff lists account for a small portion of U.S. imports according to Ravi Manghani, director of energy storage at GTM Research. But the new tariffs do have the potential to squeeze production in Southeast Asia, an increasingly essential region in the global solar market.

"Those manufacturers need to allocate to both the U.S. and the EU and everywhere else that has a tariff on China," said Shiao. "That adds to the demand pressure on Southeast Asian cell and module supply."

According to Credit Suisse, though, "the oversupplied solar sector has enough non-China capacity to supply to the U.S. market if required." GTM Research also projects an oversupply

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(<https://www.greentechmedia.com/articles/read/chinas-bombshell-solar-policy-could-cut-capacity-20-gigawatts#gs.N0lOKD8>) in the market based on recent policy changes in China that will constrict the country's demand.

The potential for additional tariffs did impact solar manufacturer stocks, which were down 5 to 10 percent on Friday according to Credit Suisse. With the Trump administration holding strong on its tough on trade agenda, those types of shocks may continue even as Credit Suisse said the reaction to the new tariffs was "overblown."

All of these impacts, though, remain somewhat up in the air.

Shiao said the codes included in the tariff announcement do not specify whether solar products are specifically targeted, as they're lumped together with other semiconductor devices like LEDs.

If the new tariffs do include solar products, some consumer goods are likely to be impacted more than cells and modules. Products like solar garden lights or solar-powered fans, according to Shiao, are rolled in with other solar products and often use Chinese cells. Forcing that portion of the market to source cells outside of China could change prices, or manufacturers could seek an exemption.

The added tariffs are unlikely to impact companies setting up shop in the U.S. in the wake of the 201 decision, unless they plan to import cells from China for module assembly in the U.S.

"This kind of kills that route," said Shiao.
"The economics already seemed tight, so I
can't imagine you could stack both those
tariffs and continue manufacturing
competitively in the U.S."

PV Magazine reported (<https://www.pv-magazine.com/2018/06/15/us-to-slap-additional-25-tariffs-on-chinese-cells-modules/>) that neither SunPower, which recently acquired SolarWorld Americas

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(https://www.greentechmedia.com/articles/read/sunpower-acquires-solarworld-americas#gs.O_gNIR0), or JinkoSolar (<https://www.greentechmedia.com/articles/read/jinkosolar-confirms-410m-investment-in-u-s-factory-to-make-tariff-free>) would source cells from China. Hanwha Q Cells Korea Corporation, which is planning a facility in Georgia (<https://www.greentechmedia.com/articles/read/hanwha-q-cells-announces-solar-module-manufacturing-plant-in-georgia>), told Greentech Media the company would use cells from its factories in Korea or Malaysia.

President Trump signaled (<https://www.theguardian.com/us-news/2018/jun/18/trump-china-tariffs-200-billion-threat>) the tariffs will go into effect if "China refuses to change its practices" on what he categorizes as unfair trading and intellectual property theft. Authorities in China, meanwhile, have indicated they will not bend to "blackmail" from the administration.

On Wednesday, the Senate Finance Committee will hold a hearing on yet another Trump tariff scheme: duties on steel and aluminum tariffs (<https://www.greentechmedia.com/articles/read/steel-aluminum-tariffs-renewables-elon-musk#gs.Z2aGZA4>) that impact a swath of U.S. industries including solar (<https://www.greentechmedia.com/articles/read/steel-aluminum-tariffs-could-add-2-cents-per-watt-to-utility-scale-solar>).

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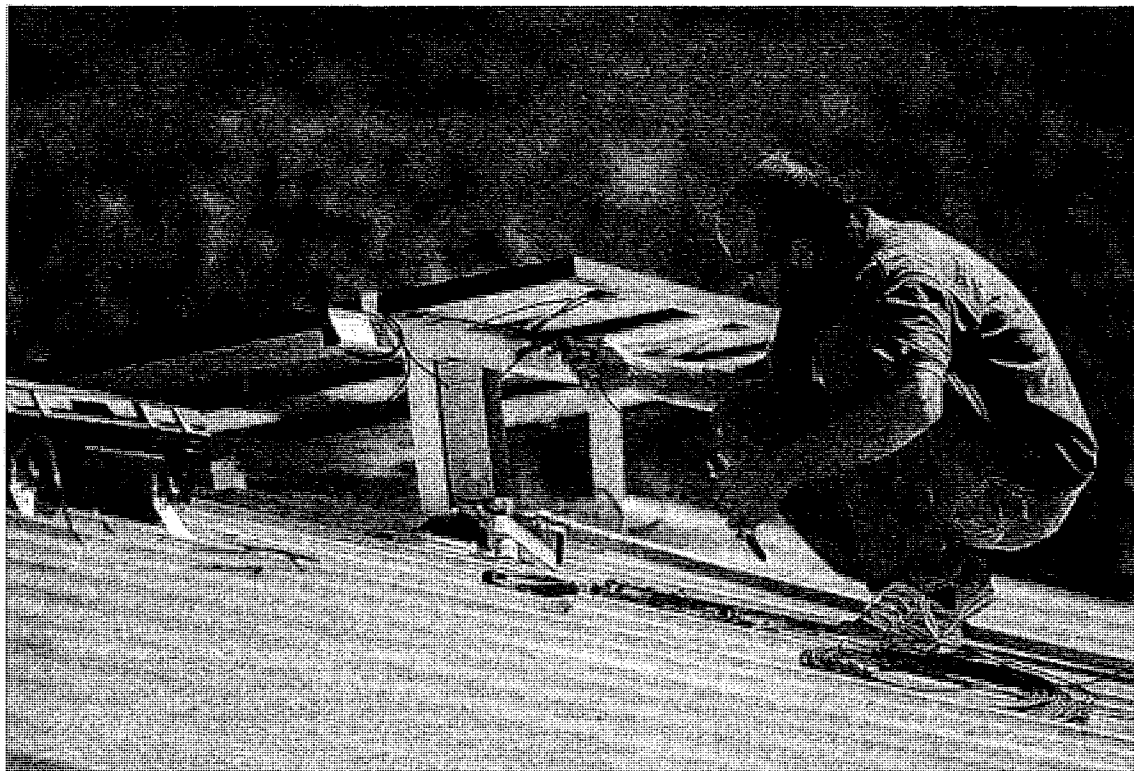
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Friday, August 17, 2018 10:40 AM ET Exclusive

Despite tariffs, solar panels getting cheaper in US

By Michael Copley



Rooftop solar companies in the U.S. say panel prices have been falling despite tariffs President Donald Trump imposed in January.

Source: Associated Press

A contraction in China's solar market is blunting the Trump administration's efforts to use tariffs to raise domestic equipment prices in hopes of spurring more U.S. manufacturing.

Four months after President Donald Trump imposed duties on most imported solar cells and panels, Beijing in May moved to limit the pace of growth in the world's biggest solar market in order to reduce subsidy costs and encourage industry consolidation. The lost demand has sent equipment prices tumbling.

"In terms of equipment costs, we definitely are seeing spot prices ... declining," Edward Fenster, executive chairman of San Francisco-based rooftop solar developer Sunrun Inc., said on an Aug. 9 earnings call. "Panel prices on a spot basis are probably approximately back where they were a year ago prior to the run-up in price ahead of the Section 201 tariff," he added, referring to the section of the Trade Act of 1974 that the administration is using to target foreign-made cells and panels.

Dana Russel, CFO and executive vice president of Vivint Solar Inc. in Utah, said on an earnings call Aug. 7 that he has also seen module prices declining after a "slight increase" several months ago due to the U.S. tariffs.

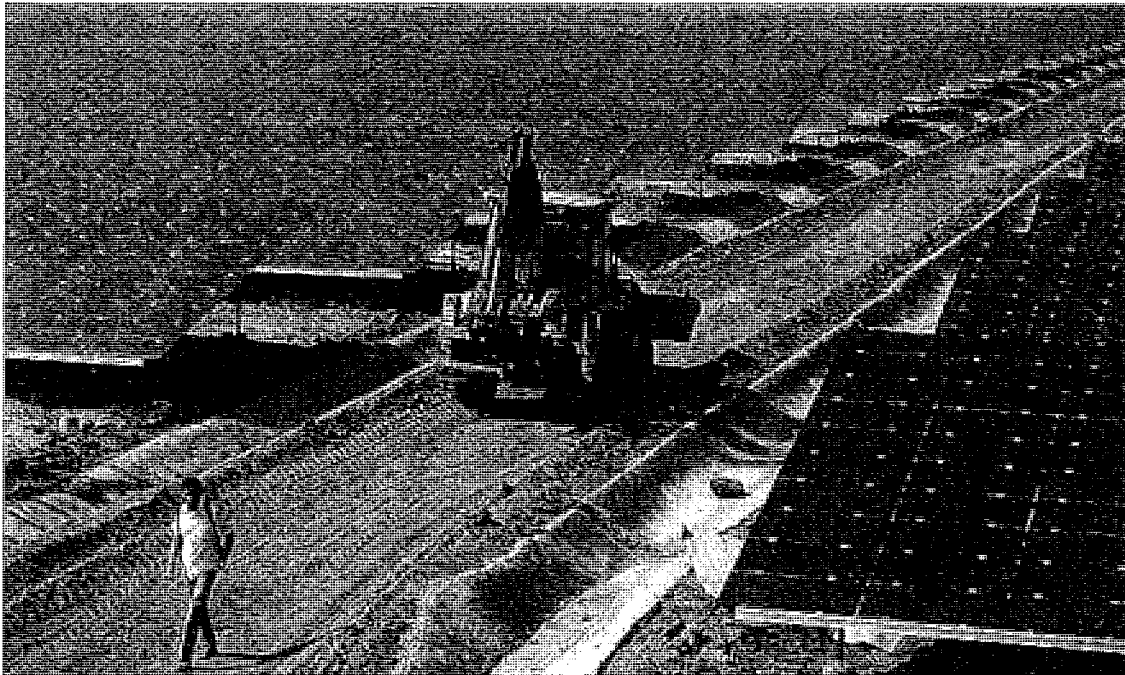
"The net result is that capital costs for solar projects in the U.S. have actually declined in recent months," TerraForm Power Inc. CEO John Marcus Stinebaugh said on an Aug. 14 earnings call. TerraForm Power, based in New York City and majority-owned by Brookfield Asset Management Inc., had nearly 3,600 MW of renewable energy assets under management as of June 30.

Edume Zoco, head of solar research at IHS Markit, in June predicted that price reductions resulting from China's new solar policies could undercut the economic rationale for manufacturing in America. While a number of foreign companies have announced plans to open plants in the U.S., Goldman Sachs analysts said "cyclical pricing pressures" and uncertainty about the timing of the tariff regime increase the risk of such an undertaking.

China-based JinkoSolar Holding Co. Ltd. is moving ahead with plans to begin shipping panels from a new factory in Florida later this year even though the cost of production in the U.S. "is a little bit higher" than in Southeast Asia, CFO Haiyun Cao said on an Aug. 13 earnings call. "We are confident we can get [a] reasonable gross margin."

The status of a U.S. factory planned by an affiliate of South Korea-based Hanwha Q CELLS Co. Ltd. is less clear.

In May, Hanwha Q CELLS Korea Corp. said it would start assembling panels at a plant in Georgia, with the output used to supply Hanwha Q CELLS Co. Ltd., or Hanwha Q CELLS. However, Hanwha Q CELLS on Aug. 3 said it is reviewing a take-private offer from Hanwha Solar Holdings Co. Ltd., its majority investor. Asked about the type of solar modules the Georgia plant will produce, Tom Mir, Hanwha Q CELLS' director of investor relations, said on an earnings call Aug. 13 that such decisions would probably be made by "some other company."



An earthmover builds a road between solar panels India.

Source: Associated Press

'Inflection point'

Solar equipment prices probably have further to fall this cycle, industry participants say. At HSBC Global Research, analysts expect "serious sequential shrinkage" in China's solar market during the second half of 2018.

"In our eyes, it is very likely that module prices will decline significantly in order to ensure high utilization rates of the [capital-intensive] module manufacturing plants in China," Pierre-Pascal Urbon, CEO and head of strategy, sales and service at SMA Solar Technology AG, said on an Aug. 9 earnings call. "This is basically good news for the end customers and investors." SMA Solar, based in Germany, makes inverters and energy management systems for the solar industry.

JinkoSolar CEO Kangping Chen said China's national solar policies "cast a shadow over" the country's market during the second half of the year, but local government subsidies and demand for smaller, unsubsidized projects should help support growth.

JinkoSolar expects activity in the U.S. to pick up in coming months after seaborne imports of solar panels plummeted following a pre-tariff buying rush in 2017. Tax guidance issued recently by the Internal Revenue Service should encourage customers to "accelerate or even ... expand" their project-development pipelines, said Gener Maio, the company's vice president of global sales and marketing.

However, the U.S. and China are not the only sources of headwinds. India, which boasts a "huge" domestic market, is also considering imposing tariffs on Chinese-made solar cells and panels, which could weigh on near-term demand, Maio said.

"India is never a high-priced market, so it shouldn't make a huge difference for Canadian Solar's profitability target," though it "might affect our shipment volume numbers," Canadian Solar Inc. Chairman, President and CEO Xiaohua "Shawn" Qu said on an Aug. 14 earnings call.

Maio said JinkoSolar has no "confirmed plan" to shift production to India in response to the tariff threat.

"India is a big market, but for equipment production in India, that certainly comes in a much later stage in this industry," Amtech Systems Inc. President and CEO Fokko Pentinga said on an Aug. 9 earnings call. "There will be a lot of people that may do panel manufacturing and maybe import cells from China, but we do not expect that equipment production in India will happen in the foreseeable future."

Amtech, which is based in Arizona and makes furnaces used in solar equipment manufacturing, plans to move some production to China because that is "where the customers are that are important for us," Pentinga said.

Executives at Sunrun and Vivint Solar, the U.S. solar project developers, said benefits of lower equipment prices are likely to start showing up in the companies' financial results later this year. But the added pricing pressure could have broader benefits for the industry long term, manufacturing executives said, by weeding out weak companies and forcing stronger ones to produce cheaper, higher-efficiency technology.

"With this price drop, solar will soon hit the critical inflection point where it will be cost-competitive without subsidies in many markets," Urbon of SMA Solar said. "In a market environment without subsidies, governments will lose the ability to control the rate of deployment. The energy transition can then become rapid."

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Solar panel glut is muting effect of Trump tariffs: SunPower

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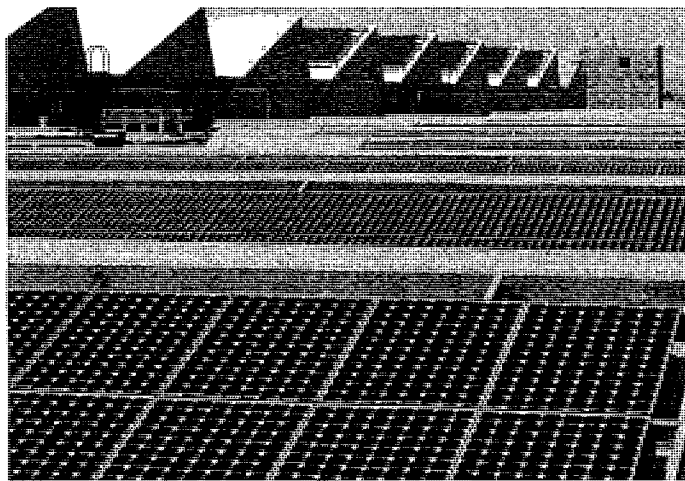
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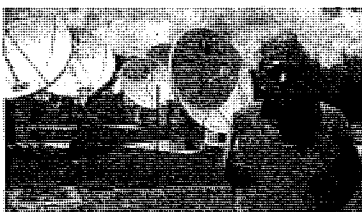
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"If you are building a large power plant your pricing has certainly come back at least halfway to what it was pre-tariff if not all the way,"

A steep global decline in the price of solar modules in recent weeks is nearly offsetting the effect of the Trump administration's 30 percent tariff on imported panels, the chief executive of a major U.S. solar company said on Monday.



FILE PHOTO: Solar panels sit on the roof of SunPower Corporation in Richmond, California March 18, 2010. REUTERS/Kim White/File Photo



'Sun and Data': Mallorca upgrades to a green tech future

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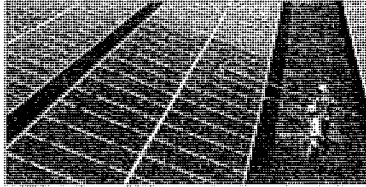
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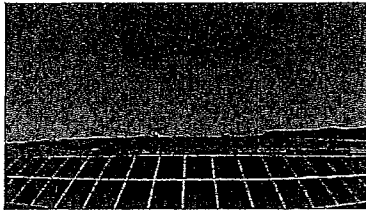
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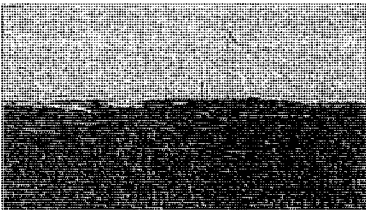
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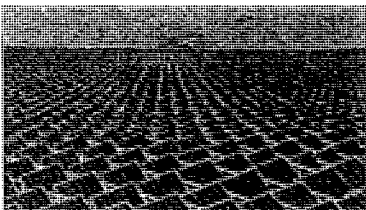
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China's solar power capacity more than doubles in 2016

(Reuters) China's installed photovoltaic (PV) capacity more than doubled last year, turning the country into the world's biggest producer of...



Europe's first solar panel recycling plant opens in France

By Geert De Clercq (Reuters) | 25 June 2018 PARIS – French water and waste group Veolia has opened what it...

While the price drop is trimming the profit margins of manufacturers, it is welcome news for purchasers of solar systems, who had been facing higher prices since the tariffs went into effect in February.

"If you are building a large power plant your pricing has certainly come back at least halfway to what it was pre-tariff if not all the way," Tom Werner, the CEO of SunPower Corp (**SPWR.O**), said in an interview following the company's second-quarter financial results announcement. "It's muting the impact of tariffs."

Solar module prices are down about 12 percent globally since China announced changes to its incentives for solar power on June 1 that have led to an oversupply of panels that had been intended for installation in China, the world's largest solar market.

SunPower is both a manufacturer of solar panels and an installer of solar power systems. The San Jose, California-based company makes its products primarily in the Philippines and Mexico and is seeking an exclusion from the U.S. tariffs.

SunPower makes high-efficiency, premium-priced panels, and Werner told analysts on a conference call that the company was "responding" to the price declines and would not allow its premium to expand.

The company is in the process of buying rival SolarWorld Americas, expanding its domestic manufacturing in Oregon to stem the impact of the tariffs.

The price decline "makes domestic manufacturing that much more challenging," Werner said, adding that SunPower was committed to closing its deal to acquire SolarWorld.

"We're going to have to increase scale to compete," he said.

SunPower expects to spend \$51 million on tariffs in the second half of this year, an amount the company would prefer to invest in its next-generation technology and scaling up its U.S. manufacturing, Werner said on a conference call with analysts.

SunPower reported a narrower-than-expected second-quarter loss and revenue that topped estimates due to strength in its rooftop solar business and cost controls. The company also said it would begin manufacturing its next-generation technology later this year.

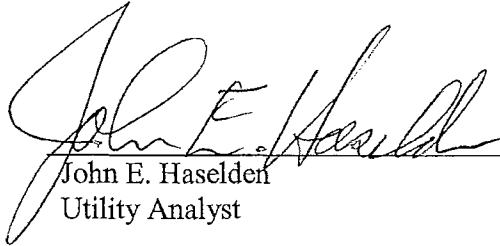
SunPower's stock was up 4.8 percent at \$7.22 in after-hours trade.

Reporting by Nichola Groom in Los Angeles; Editing by Leslie Adler
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AFFIRMATION

I affirm, under the penalties for perjury, that the foregoing representations are true.



John E. Haselden
Utility Analyst

Indiana Office of Utility Consumer Counselor

September 4, 2018

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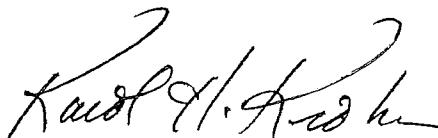
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The undersigned counsel hereby certifies that *Indiana Office of Utility Consumer Counselor's Public Testimony of John E. Haselden* was filed through the Commission's Electronic Filing System ("EFS") and a copy was served electronically, via e-mail, upon the following parties of record in this proceeding:

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