

## **Executive Summary**

The past twelve months have been eventful for Diamond State Generation Partners' (DSGP's) fuel cell projects in Delaware. The projects were built out from 8.8 MW as of May 2013 to their full 30 MW nameplate capacity in November 2013. The project's Heat Rate (MMBTU gas used/KWH produced) has been better than the Target Heat Rate in the QFCP Tariff. As a result of this higher efficiency DSGP has "banked" 77,636 credits which will be used to offset lower fuel cell efficiencies as they age. The Project's capacity factor is lower than original projections 84.4% vs. 96%.

The project also completed important milestones to maximize its revenue from PJM. As a PJM Capacity Resource the project continues to sell its energy output into the PJM Day Ahead Market. The project became eligible for and received its first capacity payments in June 2013. The project also went through a months-long process to secure a stream of revenue for reactive services through an innovative filing that was the first of its kind. DSGP believes that the project is now receiving all PJM revenue for which it is eligible.

Average monthly energy payment since achieving full power: \$1,261,174/month

Capacity payment will increase to \$18,550/month in June 2015 they averaged \$11,004 /month in 2013/14.

Reactive Services payment total \$10,939/month

**June 2013 through May 2014 Operating Results:**

This annual report covers the second year of operations from June 2013 through May 2014.

The annual total QFCP-RC PJM revenue was \$10,776,949. Table 1 below summarizes the PJM revenue on a monthly basis. Table 1 shows sharp revenue growth as the project was built out to its full capacity during 2013. The Table also shows the effects of the Polar Vortex on energy prices in the first quarter of 2014.

**Table 1**  
**Total PJM Revenue by Month**

Month	PJM Revenue
Jun-13	\$ 264,564.00
Jul-13	\$ 467,018.00
Aug-13	\$ 401,907.00
Sep-13	\$ 451,393.00
Oct-13	\$ 549,828.00
Nov-13	\$ 628,181.00
Dec-13	\$ 774,017.00
Jan-14	\$ 3,018,917.00
Feb-14	\$ 1,228,388.00
Mar-14	\$ 1,418,292.00
Apr-14	\$ 775,360.00
May-14	\$ 799,084.00
Totals	\$ 10,776,949.00

Table 2 presents the operating data for the year. The table includes information on the natural gas consumed, energy produced, average output, heat rate, and nameplate capacity installed. The average heat rate for the period was 7124. The average availability for the period was 84.4%. The next section of the report provides detailed information on the factors that drive the QFCP heat rate and availability.

**Table 2**

Fuel Cell Operating Results							
Month	MWH Generated	mmBTU Reformed	mmBTU Banked	Cumulative mmBTU Banked	Heat Rate	Avg Output, MW	Approx. Name Plate MW @ Month End
June	6,599	47,604	2,222	22,394	7,225	9.17	15
July	8,759	62,427	3,705	26,098	7,127	11.77	15
August	10,372	73,462	4,846	30,945	7,083	13.94	19
September	12,260	86,804	5,762	36,707	7,080	17.03	23
October	15,527	108,426	8,803	45,510	6,983	20.87	26
November	17,253	122,022	8,239	53,749	7,073	23.93	30
December	19,207	136,258	8,755	62,504	7,094	25.78	30
January 2014	17,844	127,594	7,129	69,633	7,151	23.98	30
February	16,649	120,402	5,298	74,931	7,232	24.77	30
March	19,116	138,492	5,832	80,763	7,245	25.73	30
April	18,583	131,989	8,313	89,076	7,103	25.81	30
May	18,988	134,625	8,732	97,808	7,090	25.52	30
Totals	181,157	1,290,105	77,636				

Total QFCP Contract payments for the period: \$30,229,576.31

Plus Total Gas Cost for the period: \$10,169,216.04

Minus Total PJM Revenues for the period: \$10,776,949.00

Equals Total Disbursements to QFCP for the period: \$29,621,843.35

Fuel Cell Availability: 84.4%; versus an originally planned availability of 96%

Primary Heat Rate & Availability Variance Drivers:

1. Routine Maintenance. Approximately 6% impact on availability
2. Grid voltage quality- Our systems are sensitive to grid voltage fluctuations and will enter an auto-restart mode if the voltage dips or spikes (even momentarily) beyond predetermined thresholds. We experienced a significant number of these events in over the operating year. Approximately 4% impact on availability.
3. Gas composition. When there is a substantial amount of ethane in the gas supply, our systems do not get the benefit of full heating value of the gas. The units run more process air which typically lowers efficiency by 5%.
  - a. The parts required to help reform the ethane were not designed to run continuously, so they fail at a rate that is higher than expected, resulting in more down time for part replacements and system cleaning.

- b. Bloom Energy continues to adapt DSGP's fuel cells to the gas conditions present at the Delaware sites. A second generation of fuel cells has been deployed at the Red Lion site, which were modified to better handle to Eastern pipeline gas composition. We expect capacity factor impacts from ethane to decline over time.

**Actions taken during the year to maximize revenues:**

DSGP has the duty to maximize PJM revenues in order to minimize collections from ratepayers, per the Tariff. DSGP has three streams of revenue from PJM for the QFCP project: energy, capacity, and reactive services.

Energy: DSGP has sold 100% of its energy output to date into the PJM Energy Market. Table 2 summarizes the past year's energy output. Note that a higher capacity factor would lead to higher PJM revenues but also higher collections from ratepayers; therefore, maximizing capacity factor is not seen as a method for meeting the Tariff's goal of minimizing collections from ratepayers.

Capacity: DSGP has successfully bid in all available PJM capacity auctions since March 2012. DSGP is exempt from the MOPR for all Incremental Auctions but will need to appeal through PJM for a continued exemption.

**DSGP PJM Auction Results:**

**2014/15**

For this Delivery Year, the first opportunity for DSGP was the First Incremental Auction (1IA) on 9/10/12. At that time, we entered 2.8MW at Brookside and 25.7MW at Red Lion. The auction cleared at \$16.56/MWd for a total of \$172,265.40. We were able to enter an additional 0.1MW into the 2IA at \$56.94 for a total of \$2078.31. We used an outage rate of 5% for the 1IA; however the units performed well lowering the outage rate, so we were able to enter an additional 0.1MW at Brookside and 0.9MW at Red Lion in the 3IA, which cleared at \$132.20/MWd for a total of \$48,253.00. The total for the year is \$222,596.71.

**2015/16**

For this Delivery Year, Bloom was eligible for the BRA and entered 2.8MW at Brookside and 25.7MW at Red Lion using an outage rate of 5%. The BRA cleared at \$167.46/MWd for a total of \$1,742,002.65. In the 1IA, Brookside had 0.1MW available. The auction cleared at \$166.73/MWd for a total of \$6,085.65. The Year to Date total is \$1,748,088.30. The 2IA is on 7/14/14 and no bids are expected. The 3IA is on 2/23/15 and if the outage rate is low again, there will be more capacity to bid into the auction.

**2016/17**

For this Delivery Year, Bloom entered 2.9MW at Brookside and 25.9MW at Red Lion for a total of 28.8MW. The BRA cleared at \$119.13/MWd for a total of \$1,252,294.56. The 1IA is on 9/8/14.

**2017/18**

For this Delivery Year, Bloom entered 2.9MW at Brookside and 26.5MW at Red Lion for a total of 29.4MW. The BRA cleared at \$120.00 for a total of \$1,287,720.00.

**Table 3**

**RPM Auction Schedule**

Delivery Year	Base Residual Auction	Incremental Auction		
		First	Second	Third
2013/14	5/3/2010	9/12/2011	7/16/2012	2/25/2013
2014/15	5/2/2011	9/10/2012	7/15/2013	2/24/2014
2015/16	5/7/2012	9/9/2013	7/14/2014	2/23/2015
2016/17	5/13/2013	9/8/2014	7/13/2015	2/29/2016

**Table 4**

**Historical Base Residual Auction Results**

Year	EMAAC
2015/16	\$167.46
2016/17	\$119.13
2017/18	\$120.00

**Table 5**

**Historical Incremental Auction Results**

Year	EMAAC
2013/14 - 1st	\$178.85
2013/14 - 2nd	\$40.00
2014/15 - 1st	\$16.56
2014/15 - 2nd	\$56.94
2014/15 - 3rd	\$132.20

Reactive Power: DSGP first investigated the economics of providing reactive power, weighing the revenue stream against the drop in efficiency that the fuel cells experience when operating at less than unity power factor. Our conclusion from speaking to other generators participating in the PJM reactive power market is that calls for reactive power are infrequent and generally total less than 100 hours per year. DSGP’s analysis showed that fixed monthly payments for reactive power would provide benefits to the ratepayers well in excess of incremental gas cost from lower efficiency.

In August of 2013, DSGP engaged McNees Wallace & Nurrick LLC, a specialist law firm in this area of this type of FERC filing. McNees engaged FERC staff prior to our formal filing, as the cost-based formula to

calculate reactive services payments is based on rotating machinery and is difficult to apply to inverter-based generation from fuel cells. McNees was able to clarify all issues with FERC staff, and the filing was made March 4, 2014. DSGP believes that this was the first filing of its kind. DSGP received the FERC Issuance Letter (See Attachment 1) for reactive services payments on April 25, 2014, effective May 1, 2014. The project now earns \$10,939 per month from PJM for reactive services.

Attachment 1

FEDERAL ENERGY REGULATORY COMMISSION  
WASHINGTON, D.C. 20426

OFFICE OF ENERGY MARKET REGULATION

Diamond State Generation Partners, LLC  
Docket No. ER14-1421-000  
4/25/14

McNees Wallace & Nurick LLC  
Attention: Robert A. Weishaar Jr.,  
Counsel for Diamond State Generation, LLC  
777 North Capitol Street  
Suite 401  
Washington, D.C. 20426

Reference: Rate Schedule for Reactive Supply and Voltage Control from Generation Sources Service

Dear Mr. Weishaar:

On March 4, 2014, you filed on behalf of Diamond State Generation Partners, LLC (Diamond State) a Rate Schedule setting forth the cost-based revenue requirement for Reactive Supply and Voltage Control from Generation Sources Service (Reactive Power) from Diamond State's 27 MW, natural gas fired fuel cell generating facility, located in New Castle, Delaware.<sup>1</sup> You state that the facility is interconnected with the transmission facilities owned by Delmarva Power and Light Company (DPL) in the PJM control area.

Pursuant to the authority delegated to the Director, Division of Electric Power Regulation – East, under 18 C.F.R. §375.307, your submittal is accepted for filing, effective May 1, 2014.

The filing was noticed on March 5, 2014, with comments, interventions, and protests due on or before March 25, 2014. Pursuant to Rule 214 (18 C.F.R. § 385.214 (2013)), to the extent that any timely filed motions to intervene and any motion to intervene out-of-time were filed before the issuance date of this order, such interventions are granted. Granting late interventions at this stage of the proceeding will not disrupt the proceeding or place additional burdens on existing parties.

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<sup>1</sup> Diamond State Generation Partners, LLC, Tariff Cost of Service, [Volume 1, RSS Tariff, 0.0.0.](#)

This acceptance for filing shall not be construed as constituting approval of the referenced filing or of any rate, charge, classification, or any rule, regulation, or practice affecting such rate or service contained in your filing; nor shall such acceptance be deemed as recognition of any claimed contractual right or obligation associated therewith; and such acceptance is without prejudice to any findings or orders which have been or may hereafter be made by the Commission in any proceeding now pending or hereafter instituted by or against Diamond State.

This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. § 385.713.

Sincerely,

Jignasa Gadani, Director  
Division of Electric Power  
Regulation – East



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