STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 7873

Programmatic Changes to the Standard-Offer Program)

AND

Docket No. 7874

Investigation into the Establishment of Standard-Offer)
Prices under the Sustainably Priced Energy Enterprise)
Development ("SPEED") Program)

Order entered: 4/2/2015

ORDER RE 2015 STANDARD-OFFER PRICES FOR FARM METHANE PROJECTS

I. INTRODUCTION

Pursuant to 30 V.S.A. § 8005a(f)(3), the Vermont Public Service Board ("Board") is required to annually review the established avoided costs under the standard-offer program. In this Order, pursuant to 30 V.S.A. § 8005a(f)(2), we determine the avoided costs that will serve as the prices for farm methane projects under the standard-offer program.

II. BACKGROUND AND PROCEDURAL HISTORY

Background

Title 30 V.S.A. § 8005a requires the Board to establish prices for each renewable energy category at avoided cost for projects in the Sustainably Priced Energy Enterprise Development ("SPEED") standard-offer program.

Section 8005a(f)(2)(B) defines avoided cost as:

> the incremental cost to retail electricity providers of electric energy or capacity or both, which, but for the purchase through the standard offer, such providers would obtain from distributed renewable generation that uses the same generation technology as the category of renewable energy for which the board is setting the price.

In addition, pursuant to Section 8005a(f)(2)(B), the definition of "avoided cost" includes consideration of each of the following criteria:

> (i) The relevant cost data of the Vermont composite electric utility system.
> (ii) The terms of the contract, including the duration of the obligation.
> (iii) The availability, during the system's daily and seasonal peak periods, of capacity or energy purchased through the standard offer, and the estimated savings from mitigating peak load.
> (iv) The relationship of the availability of energy or capacity purchased through the standard offer to the ability of the Vermont composite electric utility system or a portion thereof to avoid costs.
> (v) The costs or savings resulting from variations in line losses and other impacts to the transmission or distribution system from those that would have existed in the absence of purchases through the standard offer.
> (vi) The supply and cost characteristics of plants eligible to receive the standard offer.

Pursuant to Section 8005a(f)(2)(A)(ii), with the exemption of farm methane projects, the avoided costs serve as caps on the prices of projects solicited through the market-based mechanism.[1] Pursuant to Section 8005a(g), farm methane projects remain outside the standard-offer programmatic cap and are not solicited through a market-based mechanism.

Section 8005a(f)(3) requires that the Board annually review the established avoided costs "to decide whether they should be modified in any respect in order to achieve the goal and requirements of this subsection."

Pursuant to Section 8005a(k)(3), the SPEED Facilitator[2]

> shall transfer the environmental attributes, including any tradeable renewable energy credits, of electricity purchased under standard offer contracts to the Vermont retail electricity providers in accordance with their pro rata share of the costs for such electricity as determined under subdivision (2) of this subsection (k), except that in the case of a plant using methane from agricultural operations, the plant owner shall retain such attributes and credits to be sold separately at the owner's discretion.

1. The Board issued a determination on the avoided costs that serve as price caps in a separate Order. Dockets 7873 and 7874, Order of 3/20/15.

2. VEPP Inc. serves as the SPEED Facilitator under contract to the Board.

Procedural History

On January 15, 2010, the Board established standard-offer prices including farm methane prices pursuant to Section 8005.[3] These prices replaced the statutorily set default prices that applied to previously existing standard-offer contracts.[4] In subsequent Orders, the Board determined that the standard-offer prices for farm methane projects remain the same as those established in the 2010 Order.[5]

On March 21, 2014, pursuant to Section 8005a(f)(2), the Board determined that the standard-offer prices for farm methane projects remain unchanged from the 2010 Order.[6] In addition, in the 2014 Order, the Board remanded Docket 7874 to Board staff to conduct additional proceedings as necessary, pursuant to Section 8005a(f)(3), to review for possible adjustment the avoided costs that serve as standard-offer prices for farm methane projects.

On September 5, 2014, the Vermont Agency of Agriculture, Food and Markets, ("AAFM") filed comments regarding the calculation of avoided-cost prices for farm methane projects.

On September 9, 2014, Board staff held a workshop to discuss proposals for the calculation of avoided costs to serve as price caps on the standard-offer projects and to serve as standard-offer prices for farm methane projects. At the September 9th workshop, AAFM agreed to lead a working group to develop avoided-cost prices for farm methane projects. The working group included the Vermont Department of Public Service ("Department"), AAFM, members of the University of Vermont Extension Service ("UVM"), and representatives of the anaerobic digester industry.

On December 12, 2014, the Department, on behalf of the working group, filed a proposal for calculating avoided costs to serve as standard-offer prices for farm methane projects. On December 12, 2014, Agricultural Energy Consultants, LLC ("AEC"), Avatar Energy, LLC

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3. Docket 7533, Order of 1/15/10 (the "2010 Order").

4. The requirements of the standard-offer program were subsequently moved to Section 8005a.

5. Docket 7780, Order of 1/23/12; Dockets 7873 and 7874, Order of 3/1/13.

6. Dockets 7873 and 7874, Order of 3/23/14 (the "2014 Order").

("Avatar"), and UVM jointly filed a letter supporting the proposed avoided-cost prices for farm methane projects. AEC, Avatar, and UVM were members of the working group.

On December 17, 2014, Green Mountain Power Corporation ("GMP") filed comments on the proposed avoided-cost prices for farm methane projects.

On March 6, 2015, Board staff held a workshop to discuss the Department's proposal for calculating avoided costs to serve as standard-offer prices for farm methane projects.

III. STANDARD-OFFER PRICES FOR FARM METHANE PROJECTS

Participants' Comments

The Department and the working group reviewed the assumptions and cash-flow model used to determine the existing farm methane price. A cash-flow model analysis has been used by the Board in previous standard-offer proceedings for estimating the prices that a new project would need in order for the developer of that project to earn a reasonable return on investment.[7] The existing farm methane cash-flow model was developed by UVM in 2009, and the working group made additional updates to the model to reflect the most current information on farm methane project costs. The working group also evaluated the results of using Vermont-specific assumptions with the Cost of Renewable Energy Spreadsheet Tool ("CREST") model.[8] The working group concluded that the farm methane cash flow model represented a better approach than the CREST model for determining a farm methane price because the cash-flow model captures a farm's unique access to agricultural lending terms and farm credit programs that non-farm borrowers typically lack.

The working group recommends that the Board establish two standard-offer prices for farm methane projects differentiated by size (150 kW and less, and projects above 150 kW, as represented by 300 kW model inputs). A 150 kW-sized project represents a farm with a herd of 500 cows and a 300 kW-sized project represents a farm with a herd of 1,000 cows. The working group maintains that there are significant economies of scale associated with farm methane

7. *See* Docket 7533, Order of 1/15/10; Docket 7780, Order of 1/23/12; and Docket 7874, Order of 3/1/13.

8. The CREST model was developed by Sustainable Energy Advantage under the direction of the National Renewable Energy Laboratory.

projects and that the prices should be set to reflect these economies. The working group further asserts that most of the farms that can host a 300 kW project are already participating in the standard-offer program and that establishing a second price for smaller farms will allow for greater participation by such farms in the standard-offer program.

The working group proposes an avoided-cost price of $0.145 per kWh, fixed for the term of the contract, for farm methane projects with a nameplate capacity greater than 150 kW.[9] The working group recommends that the following assumptions be used as inputs in the cash-flow model for farm methane projects with a nameplate capacity greater than 150 kW:

- Installation Costs: Assume $8,118 per kW or $2.435 million in total costs, based on the average cost of two farm methane projects, one 225 in size and one 450 kW in size that started operation in 2011 and 2012. (The 2014 farm methane price assumed $7,628 per kW or $2.288 million in total costs.)
- Generation Component Replacement Costs: Assume a cost of $430,000 for generation component replacement in years 7 and 14 of the project life, based on input from working group members. (The 2014 farm methane price assumed no costs.)
- Nameplate Capacity: Assume a project nameplate capacity of 300 kW, based on input from working group members. (The 2014 farm methane price assumed 300 kW.)
- Capacity Factor: Assume a 60% net capacity factor, based on data from seven existing farm methane projects and expectations about future operations. (The 2014 farm methane price assumed 76.5%.)
- Annual Maintenance Cost: Assume $130,616 per year, based on input from working group members. (The 2014 farm methane price assumed $157,448 per year.)
- Annual Revenue: Assume $54,766 in annual revenues for bedding material sales, based on input from working group members. (The 2014 farm methane price assumed $95,000 per year.)
- Renewable Energy Credit ("REC") Revenue: Assume an initial REC value of $0.04 per kWh that declines incrementally to $0.01 per kWh by year 20. (The 2014 farm methane

9. The levelized avoided-cost price for farm methane projects was $0.141 per kWh in 2014.

price assumed an initial REC value of $0.025 per kWh that increased to $0.04 per kWh by year 20.)

- Inflation: Assume 1.89% annually. (The 2014 farm methane price assumed 1.6%.)
- Rate of Return: Assume 9.6%, which is equivalent to that of GMP's current return on equity. (The 2014 farm methane price assumed 9.75%.)
- Grants: Assume approximately $500,000 available through a Rural Energy Assistance Program ("REAP") grant for project financing, based on input from working group members. (The 2014 farm methane price assumed $438,000 from state and federal grants.)
- Interest Rate on Debt: Assume projects are financed using conventional loans with the collateral from farm real estate, based on input from working group members. Assume a 3.75% interest rate for installation costs and assume a 7.0% interest rate for generation component replacement costs. (The 2014 farm methane price assumed a 5.5% interest rate.)
- Debt Term: Assume a loan life of 20 years that matches the project life of 20 years, based on input from working group members. (The 2014 farm methane price assumed a loan life of 10 years.)

The working group proposes an avoided-cost price of $0.216 per kWh, fixed for the term of the contract, for farm methane projects with a nameplate capacity less than or equal to 150 kW. The working group recommends that the following assumptions be used as inputs to the cash-flow model for farm methane projects with a nameplate capacity less than or equal to 150 kW:

- Installation Costs: Assume $14,277 per kW or $2.141 million in total costs, based on the average cost of three farm methane projects, one 65 kW in size and two 150 kW in size that started operation between 2011 and 2013.
- Generation Component Replacement Costs: Assume a cost of $216,000 for generation component replacement in years 7 and 14 of the project life, based on input from working group members.

- Nameplate Capacity: Assume a project nameplate capacity of 150 kW, based on input from working group members.
- Capacity Factor: Assume a 60% net capacity factor, based on data from seven existing farm methane projects and expectations about future operations.
- Annual Maintenance Cost: Assume $71,987 per year, based on input from working group members.
- Annual Revenue: Assume $29,958 in annual revenues for bedding material sales, based on input from working group members.
- REC Revenue: Assume an initial REC value of $0.04 per kWh that declines incrementally to $0.01 per kWh by year 20.
- Inflation: Assume 1.89% annually. (The 2014 farm methane price assumed 1.6%.)
- Rate of Return: Assume 9.6%, which is equivalent to that of GMP's current return on equity.
- Grants: Assume approximately $500,000 available through a REAP grant for project financing, based on input from working group members.
- Interest Rate on Debt: Assume projects are financed using conventional loans with the collateral from farm real estate, based on input from working group members. Assume a 3.75% interest rate for installation costs and assume a 7.0% interest rate for generation component replacement costs.
- Debt Term: Assume a loan life of 20 years that matches the project life of 20 years, based on input from working group members.

The working group also proposes for each project-size category a second price based on the transfer of the project RECs to the Vermont utilities for resale (i.e., the cash-flow model analysis assumes no value for REC revenues). For prices based on the transfer of RECs, the working group proposes a levelized avoided-cost price of $0.174 per kWh for farm methane projects with a nameplate capacity greater than 150 kW and $0.246 per kWh for projects with a nameplate capacity less than or equal to 150 kW. The working group contends that modifications can be made to the standard-offer contract to reflect the transfer of RECs.

The working group contends that the 20-year term of the standard-offer contract reduces the risk of market price volatility. The working group argues that farm methane projects will reduce regional network service charges, capacity costs, and local transmission and distribution costs because projects are expected to be available during peak load periods. In addition, the working group projects that the costs or savings resulting from variations in line losses and other impacts to the distribution and transmission system will be minor for farm methane projects.

GMP contends that both the methodology and proposed avoided costs are reasonable for farm methane projects. GMP also asserts that farm methane projects include other benefits, including farm waste management, that are not captured in the avoided cost determination.

IV. DISCUSSION AND CONCLUSION

We accept the working group's recommendation to establish two standard-offer prices for farm methane projects differentiated by projects with a nameplate capacity greater than 150 kW and projects with a nameplate capacity less than or equal to 150 kW. In Dockets 7533 and 7780 and in previous Orders in this proceeding, we concluded that: (1) standard-offer prices should be based upon the assumption of efficiently sized and located generation to ensure that price incentives are not excessive; and (2) the disaggregation of categories, with higher prices for smaller units, is inconsistent with this principle as it requires ratepayers to pay more without acquiring more renewable energy. In the case of farm methane projects, we are persuaded that a price based on a smaller unit is appropriate because most of the farms that can host a 300 kW-sized project are already participating in the standard-offer program and because the establishment of a second price for smaller farms will allow for greater participation in the standard-offer program.

Based on our review of the assumptions and the cash-flow model analysis, we accept the working group's recommendation of an avoided cost of $0.145 per kWh for farm methane projects with a nameplate capacity greater than 150 kW. Regarding the installed cost for these projects, we accept the value of $8,118 per kW based on the cost data provided for the two most recent operating farm projects with a nameplate capacity greater than 150 kW. We note, however, that these two projects represent the highest cost per kW among the existing five

projects for which cost data was provided. In next year's price review, we intend to evaluate whether we should be basing the price on the most efficient projects, not the most expensive. We are also persuaded that the calculation of a price for a farm methane project should include generation component replacement costs and that the value of $430,000 in years 7 and 14 of the project life is appropriate.

Using the assumptions recommended by the working group, the cash-flow model calculates an avoided cost of $0.145 per kWh for farm methane projects with a nameplate capacity greater than 150 kW. Accordingly, for farm methane projects with a nameplate capacity greater than 150 kW, we establish an avoided cost of $0.145 per kWh, fixed over the term of the 20-year contract.

Based on our review of the assumptions and the cash-flow model analysis, we do not entirely accept the working group's recommendation with regard to an avoided cost for farm methane projects with a nameplate capacity less than or equal to 150 kW. With respect to installed costs, the working group based its assumption of $14,277 per kW on the average cost of three farm methane projects, one 65 kW in size and two 150 kW in size. We conclude that the use of cost data from a 65 kW-sized project is not consistent with the principle of encouraging efficiently sized projects. While we are establishing a second price for smaller-sized projects, we are still adhering to the principle of efficiently sized projects within the smaller-sized category to ensure that price incentives and therefore ratepayer costs are not excessive. Therefore, we conclude that the appropriate value for installed costs is $13,108 per kW, based on cost data from the two 150 kW-sized projects. With respect to the remaining assumptions, we accept the working group's recommendations.

Using the assumptions recommended by the working group with changes to the assumption on installed costs, the cash-flow model calculates an avoided cost of $0.199 per kWh for farm methane projects with a nameplate capacity less than or equal to 150 kW. Accordingly, for farm methane projects with a nameplate capacity less than or equal to 150 kW, we establish an avoided cost of $0.199 per kWh, fixed over the life of the project.

We do not accept the working group's proposal to establish a second price for each project size category based on the transfer of the project's RECs to the Vermont utilities for

resale. Pursuant to Section 8005a(k)(3), unlike the other standard-offer project categories, a farm methane plant owner "shall retain" any RECs generated by the project "to be sold separately at the owner's discretion." The working group has not demonstrated that the SPEED Facilitator has authority pursuant to Section 8005a to buy or transfer RECs from farm methane projects. Accordingly, we decline to establish a second set of prices based on such transfer.

Section 8005a(e) requires that the term of a standard offer "shall be 10 to 20 years, except that the term of a standard offer for a plant using solar power shall be 10 to 25 years." Consistent with the Board's determination in Dockets 7533 and 7780 and previous Orders in this proceeding, we conclude that the term of a standard-offer contract for farm methane projects should be based on the term used to calculate the standard-offer avoided cost, and that the term should be based on the assumed life of the project capped by the statutory requirement of 20 years.

V. ORDER

IT IS HEREBY ORDERED, ADJUDGED, AND DECREED by the Public Service Board ("Board") of the State of Vermont that:

Effective for any standard-offer contract executed after April 1, 2015, pursuant to 30 V.S.A. § 8005a(f)(2), the following avoided costs will serve as the prices for farm methane projects under the standard-offer program: (1) $0.145 per kWh fixed over the 20-year contract for projects with a nameplate capacity greater than 150 kW; and (2) $0.199 per kWh fixed over the 20-year contract for projects with a nameplate capacity less than or equal to 150 kW.

Dated at Montpelier, Vermont, this 2nd day of April, 2015.

s/James Volz)
)
) PUBLIC SERVICE
)
s/Margaret Cheney) BOARD
)
) OF VERMONT
s/Sarah Hofmann)

OFFICE OF THE CLERK

FILED: April 2, 2015

ATTEST: s/Susan M. Hudson
Clerk of the Board

NOTICE TO READERS: This decision is subject to revision of technical errors. Readers are requested to notify the Clerk of the Board (by e-mail, telephone, or in writing) of any apparent errors, in order that any necessary corrections may be made. (E-mail address: psb.clerk@state.vt.us)

Appeal of this decision to the Supreme Court of Vermont must be filed with the Clerk of the Board within thirty days. Appeal will not stay the effect of this Order, absent further order by this Board or appropriate action by the Supreme Court of Vermont. Motions for reconsideration or stay, if any, must be filed with the Clerk of the Board within ten days of the date of this decision and Order.