

## **2023 Resource Report**

# **Barton Village Inc. Electric Department**

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**Submitted to:**

the Vermont Public Utility Commission  
and the Vermont Department of Public Service

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**Submitted by:**

Vermont Public Power Supply Authority  
on behalf of Barton Village Inc. Electric Department  
in fulfillment of Vermont Public Utility Commission Rule 5.206(B)



## Overview & Introduction

As a member of the Vermont Public Power Supply Authority (VPPSA), Barton Village Inc. Electric Department ("BVED") relies on VPPSA to plan for and manage its power supply in New England's wholesale markets. In this role, VPPSA not only manages BVED's power supply in the ISO New England's (ISO-NE) wholesale power markets, but also plans for and solicits new power supplies for BVED and its other municipal utility members.

The information contained in this report describes BVED's current power supplies, future needs and acquisition strategies over the next five years. It is divided into four sections.

**I. Electricity Demand**

This section shows how electricity demand has changed over the past five years, and forecasts the demand for the upcoming five years.

**II. Electricity Supply**

This section describes each resource in BVED's portfolio of supplies, as well as the new resources that have been acquired over the past year.

**III. Electricity Supply & Demand**

This section illustrates the balance between the supply and demand for energy, capacity, and renewable energy credits.

**IV. Anticipated Transactions & Acquisition Strategy**

This section lists the resources that are expected to be acquired over the upcoming five-year period, and outlines the strategy for procuring them.

## I. Electricity Demand

In 2023, BVED's energy requirements<sup>1</sup> ("Load") totaled 16,712,625 kWh, and its coincident annual peak with ISO-NE was 2,498 kW on September 7<sup>th</sup> at hour ending 18. As shown in Table 1, BVED's energy requirements have fluctuated by about +/- 4% per year while its peak load<sup>2</sup> has fluctuated more widely. This peak fluctuation is primarily due to BVED's run-of-river, behind-the-meter hydro facility, which is not always operating at its capacity during the coincident peak hour.

*Table 1: Historical Loads*

Year	Load (kWh)	% Change	Peak Load (kW)	% Change
2019	15,573,781		2,543	
2020	16,152,540	3.7%	2,630	3.4%
2021	16,303,830	0.9%	2,608	-0.8%
2022	16,693,486	2.4%	1,842	-29.4%
2023	16,712,625	1.0%	2,498	35.6%

BVED's energy needs are forecasted annually using a multiple regression model whose inputs include historical loads, weather, and economic variables like employment and income. These forecasts are adjusted for anticipated changes in net metering, heat pump and electric vehicle penetrations. Table 2 shows the results of the most recent 5-year load forecast.

*Table 2: Forecast Loads*

Year	Load (kWh)	% Change	Peak Load (kW)	% Change
2024	16,303,348		2,523	
2025	16,299,291	-0.02%	2,548	1%
2026	16,433,974	0.83%	2,574	1%
2027	16,606,339	1.05%	2,600	1%
2028	16,914,915	1.02%	2,626	1%

Assuming normal weather, loads (kWh) are forecast to grow by 0.1-1% per year. Peak loads (kW) are expected to increase as well, about 1.0% per year on average.

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<sup>1</sup> BVED's energy requirements ("Load") account for behind-the-meter hydro and solar generation (where applicable), transmission losses, and adjustments for Vermont's Standard Offer Program. Also known as "Total Load - Including Losses", it is not the same as BVED's Real-Time Load Obligation (RTLO) with ISO New England.

<sup>2</sup> Peak Load is defined as the annual coincident peak with ISO New England and is based on RTLO.

## II. Electricity Supply

BVED's power supply is made up of owned generation, long-term contracts, and short-term contracts. The resources in BVED's portfolio represent a range of fuel types and technologies. In addition, they are located throughout Vermont, New England and New York, and many of their expiration dates have been chosen not to overlap. As a result, they act as a diversified portfolio that effectively hedges BVED's power supply costs against the cost of serving load in ISO New England's energy, capacity and ancillary markets. These power supply resources are summarized in Table 3.

*Table 3: 2023 Electricity Supply Resources*

Resource	2023 MWH	%	Fuel	Exp. Date
Barton Hydro	6,340	32.9%	Hydro	Life of Unit
Brookfield 2023-2027	3,910	20.3%	Hydro	12/31/27
Fitchburg Landfill	1,679	8.7%	Landfill Gas	12/31/31
Kruger Hydro	1,997	10.4%	System	12/31/37
Market Contracts	2,079	10.8%	System	Varies
NYPA Niagara Contract	1,989	10.3%	Hydro	9/1/25
NYPA St. Lawrence Contract	62	0.3%	Hydro	4/30/32
Project #10	20	0.1%	Oil	Life of Unit
Ryegate Facility	450	2.3%	Wood	10/31/21
Standard Offer Program	345	1.8%	Solar	Varies
Stetson Wind 2023-2027	375	1.9%	Wind	12/31/27
<b>TOTAL RESOURCES</b>	<b>19,246</b>	<b>100.0%</b>		

Total Load Including Losses	16,713			
ISO Exchange (+ Purchase/- Sale)	-2,534	-13.2%		

## Resource Descriptions

The following bullets summarize the essential characteristics of each resource, and in some cases, include notes that describe unique aspects of the resource.

### 1. Barton Hydro

- Size: 1.4 MW
- Fuel: Hydro
- Location: Charleston, VT
- Entitlement: 100% (1.4 MW), Owned
- Products: Energy, capacity, renewable energy credits (VT Tier I & MA II)
- End Date: Life of Unit

### 2. Brookfield Hydro 2023-2027

- Size: 8 MW On Peak, 7 MW Off Peak 1.4 MW
- Fuel: Hydro
- Location: Varies
- Entitlement: 0.5 MW On Peak, 0.4 MW Off Peak
- Products: Energy, VT Tier I renewable energy credits
- End Date: 12/31/27

### 3. Fitchburg Landfill

- Size: 4.5 MW
- Fuel: Landfill Gas
- Location: Westminster, MA
- Entitlement: 5.553%, PPA
- Products: Energy, capacity, renewable energy credits (MA Class I)
- End Date: 12/31/31

### 4. Kruger Hydro

- Size: 6.7 MW
- Fuel: Hydro
- Location: Maine and Rhode Island
- Entitlement: 5.7579%, 0.391 MW, PPA
- Products: Energy, capacity
- End Date: 12/31/37
- Notes: The Electric Department has an agreement with VPPSA to purchase unit contingent energy and capacity from six hydroelectric generators. The contract does not include the environmental attributes and appears as system mix in the summary table.

**5. Market Contracts**

- Size: Varies
- Fuel: New England System Mix
- Location: New England
- Entitlement: Varies (PPA)
- Products: Energy
- End Date: Varies, less than 5 years.
- Notes: The Electric Department purchases system power from various other entities under short-term (5 year or less) agreements.

**6. New York Power Authority (NYPA)**

- Size: 3.044 MW (Niagara), 0.195 MW (St. Lawrence)
- Fuel: Hydro
- Location: New York State
- Entitlement: 0.25 MW (Niagara PPA), 0.015 MW (St. Lawrence PPA)
- Products: Energy, capacity, renewable energy credits
- End Date: 4/30/2032
- Notes: NYPA provides hydro power to the Electric Department under two contracts, which will be extended at the end of their term.

**7. Project 10**

- Size: 40 MW
- Fuel: Oil
- Location: Swanton, VT
- Entitlement: 2.16% (0.864 MW), joint-owned through VPPSA
- Products: Energy, capacity, reserves
- End Date: Life of unit
- Notes: As the joint-owner, VPPSA has agreements with the Electric Department pay for and purchase 2.16% of the unit's output.

**8. Ryegate**

- Size: 20.5 MW
- Fuel: Wood
- Location: East Ryegate, VT
- Entitlement: 0.281% PPA
- Products: Energy, capacity, renewable energy credits (CT Class I)
- End Date: 10/31/2032

## 9. Standard Offer Program

- Size: Small renewables, primarily solar < 2.2 MW
- Fuel: Mostly solar, but also some wind, biogas and micro-hydro
- Location: Vermont
- Entitlement: 0.2883% (Statutory)
- Products: Energy, capacity, renewable energy credits
- End Date: Varies
- Notes: The Electric Department is required to purchase power from small power producers through the Vermont Standard Offer Program in 2023, in accordance with PUC Rule #4.300. The entitlement percentage fluctuates slightly each year with the Electric Department's pro rata share of Vermont's retail energy sales.

## 10. Stetson Wind 2023-2027

- Size: 57 MW
- Fuel: Wind
- Location: Maine
- Entitlement: 0.351% (PPA)
- Products: Energy, VT Tier I renewable energy credits
- End Date: 12/31/24

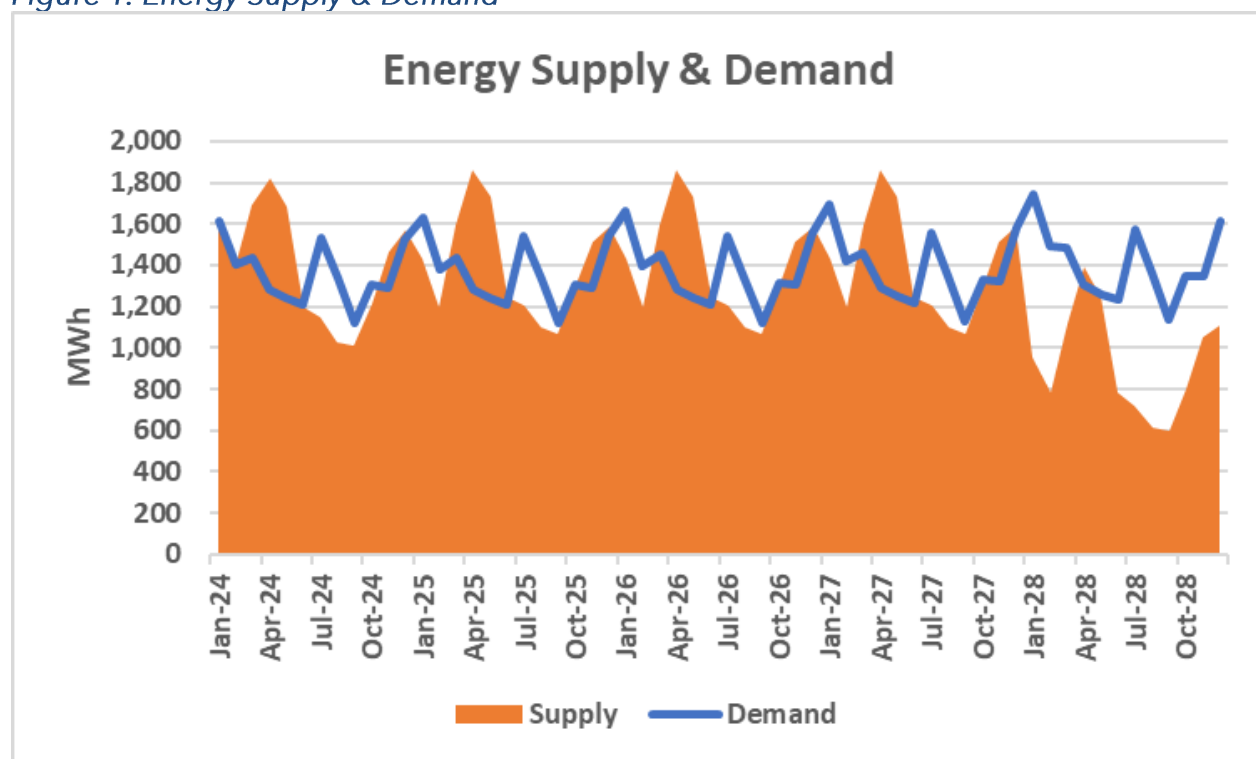
### III. Resource Supply & Demand

Energy, capacity and Renewable Energy Credits (RECs) are the primary products that BVED needs to manage, and the following sections illustrate the forecasted balance between their supply and their demand over the next five to twenty years.

#### Energy

Figure 1 shows the current forecast of energy supply and demand for the next five years. The alignment is seasonal and fluctuates with the hydrological conditions for Barton Hydro. The Brookfield PPA expires at the end of 2027 so that resource will need to be replaced via the Planned Purchase process.

*Figure 1: Energy Supply & Demand*

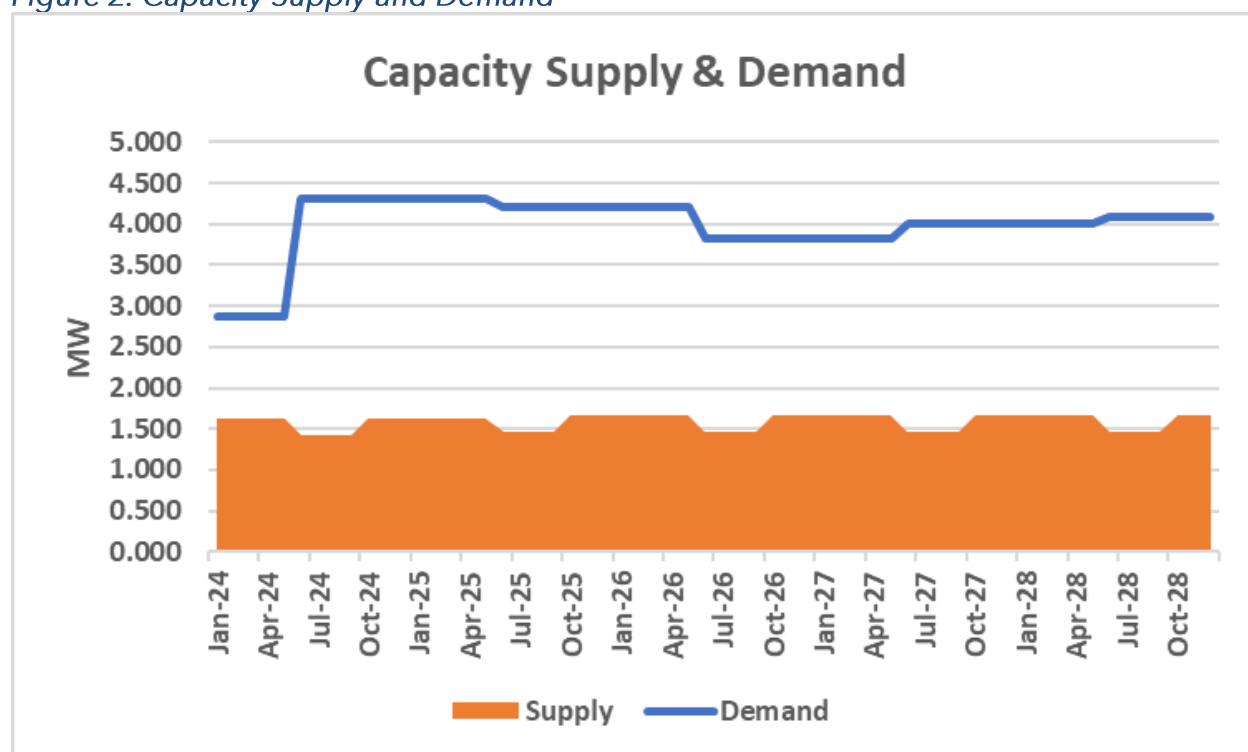




## Capacity

Figure 2 shows the capacity supply and demand balance for the next five years. The supply is forecasted to be 40-60% lower than the demand for this time period. However, this outcome depends on stream flows at the annual coincident peak hour with ISO New England. If conditions are wetter-than-forecast, then Barton Hydro, which is behind-the-meter, will close the majority of this gap. If the conditions are dry then BVED's capacity supply deficit will be fulfilled by ISO New England's Forward Capacity Market. Capacity prices bottomed out in 2023 and have increased minimally through the majority of the forecast period.

*Figure 2: Capacity Supply and Demand*



## Renewable Energy Credits

Figure 3 and

### Tier II

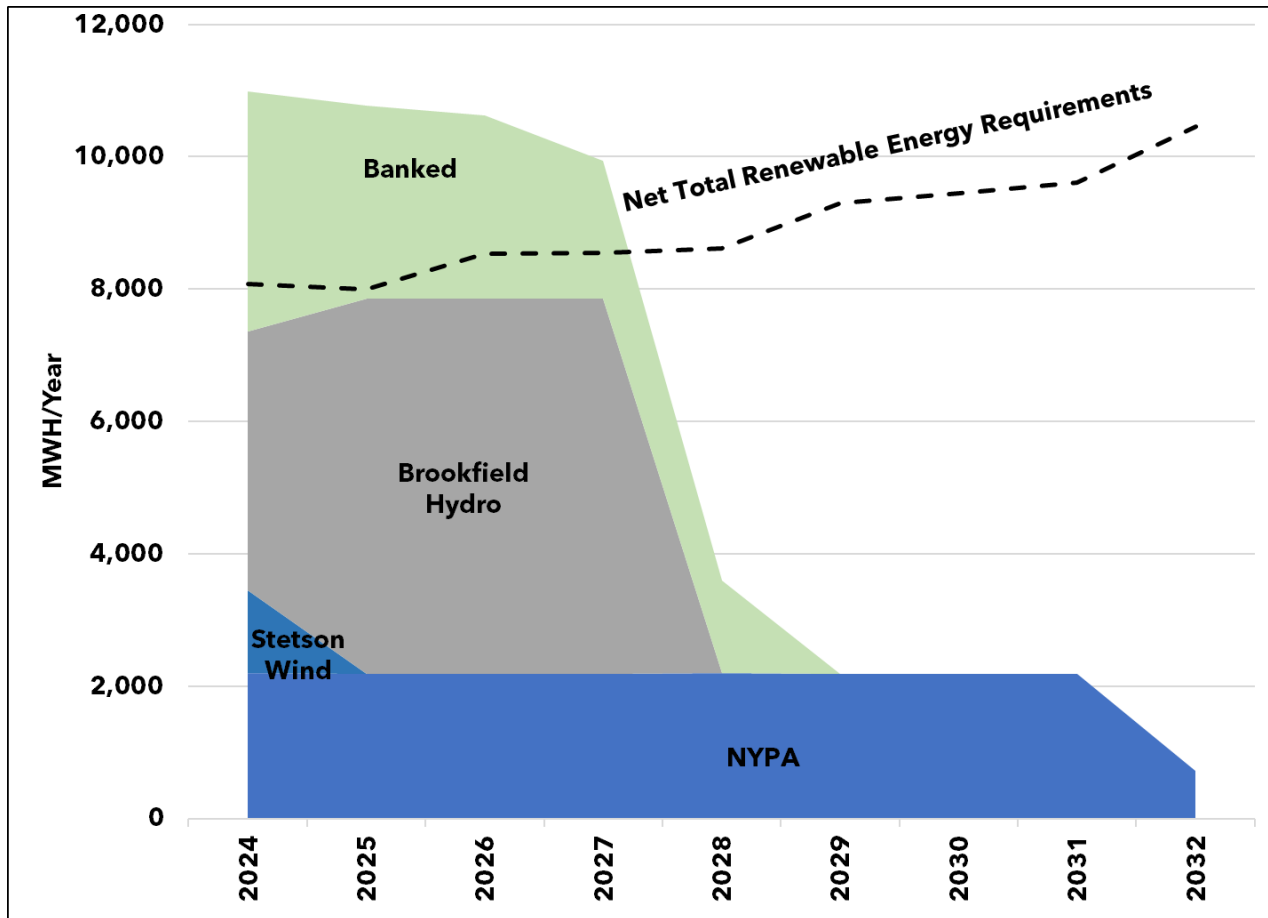
BVED's Tier II deficit is expected to rise from about 270 MWH in 2024 to over 1,100 MWH in 2032. As a result, additional Tier II RECs and/or resources will be acquired and/or developed to meet the RES requirements.

Figure 4 illustrate BVED's need for RECs under Vermont's Renewable Energy Standard (RES).

### Tier I

Due to a large Tier I purchase in 2023 that will be banked for use for 2024 compliance as well as the 5 year Brookfield Hydro PPA, BVED anticipates banking RECs through 2027. Once the Brookfield PPA expires and all banked RECs are used, BVED will need to purchase 5,000-9,700 as the obligation increases. This will be filled either with a bundled energy and REC purchase or a REC only purchase.

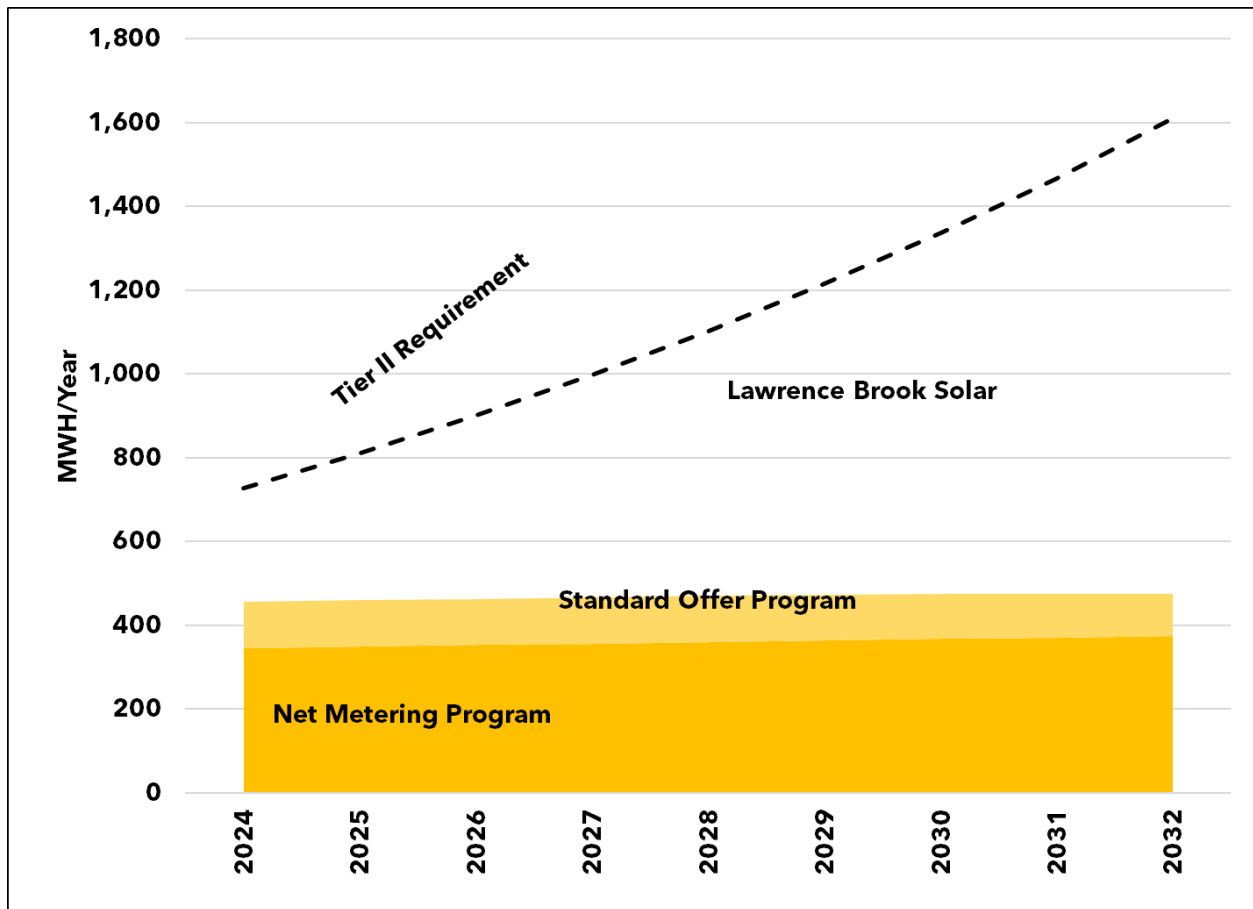
*Figure 3: Vermont Tier I Supply & Demand*



## Tier II

BVED's Tier II deficit is expected to rise from about 270 MWH in 2024 to over 1,100 MWH in 2032. As a result, additional Tier II RECs and/or resources will be acquired and/or developed to meet the RES requirements.

*Figure 4: Vermont Tier II Supply & Demand*



## IV. Anticipated Transactions & Acquisition Strategy

VPPSA anticipates that BVED may enter into one or more of the transactions that are listed in Table 4.

*Table 4: Anticipated Hedging Transactions*

Product	Action	Term	Quantity	Anticipated Price Range	Transaction Anticipated
7x24 Energy	Purchase or Sale	1 month	0-0.5 MW	\$26-\$95 /MWH	Monthly / Seasonally
On / Off Peak Energy	Purchase	1-60 months	0-1 MW	\$25-\$100 /MWH	Monthly / Seasonally
Long-Term Bundled PPAs	Purchase	5+ years	0-2 MW	\$30-\$70 /MWH	None anticipated.
Capacity	Purchase	5+ years	0 MW	\$2-\$5 /kW-month	None anticipated.
VT Tier I RECs	Purchase	1-5 years	5,000-6,000 MWH/Year	\$4 - \$10 /MWH	2027
VT Tier II RECs	Purchase	1-5 years	270-650 MWH/Year	\$35 - \$45 /MWH	July 2024

## Energy Acquisition Strategy

### 7x24 Energy

VPPSA's Power Supply Authorities Policy requires that energy supplies be within +/-5% of the forecasted demand in each month of the year. This is known as the hedge ratio, and it is simply the ratio of the forecasted supply to the forecasted demand. Any imbalances between supply and demand are hedged to these levels before the operating month begins. In practice, changes in weather, generator availability and forecast error sometimes combine to push the actual percentage outside of the +/-5% threshold.

The following three-step process is used to balance supply and demand on a monthly basis within the current budget (calendar) year.

#### 1. Update Budget Forecast

- a. The budgeted volumes (MWH) are updated to reflect known changes to demand and supply including unit availability, fuel supply, and hydrological conditions.

#### 2. Hydroelectric Adjustment

- a. Supply is reduced by one standard deviation from the long-term average in order to avoid making sales that could end up being unhedged by supply in the event of a dryer-than-normal month.

#### 3. Execute Purchases or Sales

- a. **Internal Transactions:** VPPSA seeks first to make internal transactions between its members to balance supply and demand. The transactions are designed to result in a hedge ratio that falls within the +/-5% range that is required by VPPSA's Power Supply Authorities Policy.
- b. **External Transactions:** In the event that internal transactions cannot bring BVED into the +/-5% range, external transactions are placed with power marketers, either directly or through a broker.
- c. **Price:** For Internal Transactions, the price of the transaction is set by an average of the bid-ask spread as reported by brokers on the date of the transaction. For External Transactions, the price is set through a negotiation with the counterparty.

### On / Off Peak Energy

Known within VPPSA as “planned purchases”, these transactions are almost always purchases. They typically take place no more than once a year, usually carry a 1-5 year term, and if possible, are executed at a time when market prices are at or below budgeted levels.

These purchases are designed to fit the on and off-peak energy needs in each month of the year as precisely as possible. As a result, they minimize the need for monthly 7x24 hedging transactions under VPPSA’s Power Supply Authorities Policy.

The solicitation method is an informal Request for Proposals (RFP), and follows a three-step process.

1. **Pre-Approval Term Sheet:** First, the proposed purchase volumes and anticipated prices are documented in a standardized term sheet. This document is distributed to each VPPSA member for their pre-approval, and it defines their share of the total purchase.
2. **Issue RFP:** Once all the pre-approvals are received, the term sheet is distributed to three or more power marketers, who are asked to make their best offer by a deadline, typically within 5 business days.
3. **Evaluate & Execute:** When all the bids are received, VPPSA evaluates them to determine the lowest cost bid, and executes the purchase with that counterparty. Then the purchase is allocated to each VPPSA member according to their pre-approved term sheet, and the data is entered into VPPSA’s database for scheduling, delivery and invoice tracking.

### Long-Term Bundled PPAs

VPPSA evaluates long-term Purchased Power Agreements (PPAs) for bundled energy, capacity, renewable energy credits, and/or ancillary products on an ongoing basis. There is currently no plan for a long-term PPA, although additional energy contracts will be required once the Brookfield contract expires at the end of 2027. Because long-term PPAs are subject to PUC approval, the acquisition strategy is simply to negotiate the best terms and to make contract execution contingent on PUC approval.

## Capacity Acquisition Strategy

Capacity is seldom acquired as a stand-alone product, and because market prices are fixed by the Forward Capacity Market three years in advance of the operating year, there is little opportunity to make short-term (< 5 year) capacity purchases. ISO New England is on track to drastically change the capacity market to a prompt/seasonal market which is likely to alter BVED's capacity procurement strategy once the new market details are known. Beyond purchasing capacity, there is short-term opportunity on the demand side. For example, VPPSA forecasts monthly and annual coincident peak loads, and communicates the forecast of the peak day and hour to its members. As a result, all available demand-side actions are taken to reduce capacity requirements. This presently includes maximizing behind-the-meter generation such as load-reducing hydro, demand response using VPPSA's contract with Virtual Peaker<sup>3</sup>, and exploring battery storage for peak shaving.

## REC Acquisition Strategy

VPPSA acquires RECs on behalf BVED and its other members during the quarterly trading periods that are defined in the NEPOOL Generator Information System (GIS)<sup>4</sup>. The acquisition strategy has three parts.

1. First, VPPSA completes an analysis of Tier I and Tier II requirements before or during the annual REC trading period. Because REC banking is limited to three years, the analysis never calls for purchasing more RECs than can be used during that time frame.
2. Second, broker quotes are compared to the Alternative Compliance Payment and budgeted REC prices to decide when to purchase RECs.
3. VPPSA may purchase smaller volumes of Tier I RECs toward the close of quarter 4 if prices are lower than budget.

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<sup>3</sup> More information on Virtual Peaker can be found on their website at <https://www.virtual-peaker.com/>.

<sup>4</sup> <https://www.nepoolgis.com/>



## Generation and Transmission Facility Transactions

### Generation

VPPSA continues to work with solar developers to develop Tier II qualifying solar projects within its members service territories. Because BVED expects to have a deficit of Tier II RECs for the coming five years, BVED may choose to develop and/or participate in a solar project in the coming year(s).

### Transmission

BVED does not anticipate any transmission facility transactions in the coming year.

## Waiver Request

In accordance with Rule 5.204, BVED requests a waiver of the notification for short-term transactions that will be subject to after-the-fact reporting, pursuant to Rule 5.206(A). These transactions could be up to five years in nature and are designed to either hedge BVED's short-term exposure or maximize short-term value of existing resources. BVED anticipates seeking individual waivers of any longer-term purchases as otherwise required by Rule 5.200, if necessary.