



Audio instructions

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Audio connection **Preferred choice**

- Use computer audio
- Call me at +1 Phone number
- Call in Call me at
- Don't connect to audio

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Call In

Call in from another application

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- Enter**
Access code XXX XXXXXX #
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Viewing BPA Computer's ap...

PRESENTATION

ENERGY EFFICIENCY

Mute Start video Share

Participants Chat

Use to mute and unmute

Use to express emotion

Use to view participant list and chat panel



Daily Demand Voltage Reduction

Customer Webinar

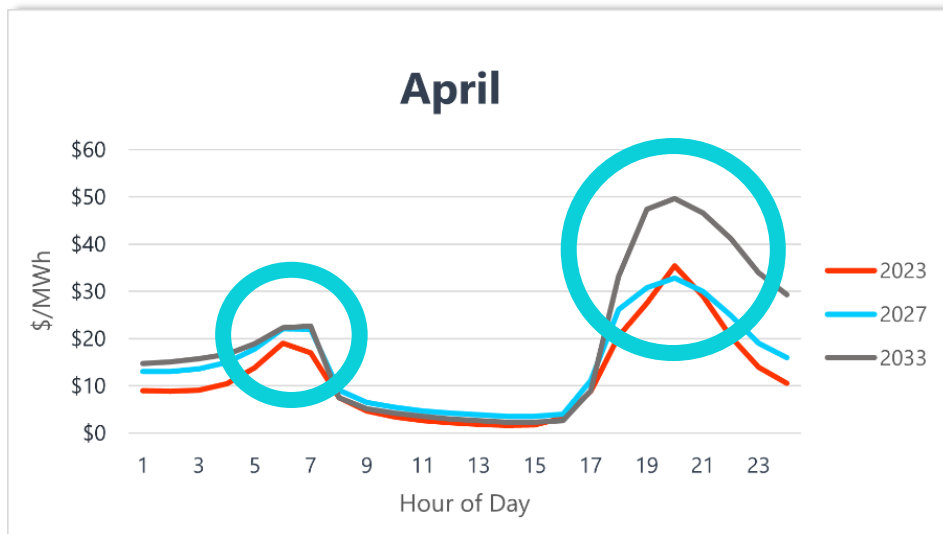
January 18, 2024



DVR: A Demand Flexibility Perspective

- The 2022 BPA Resource Program and 2021 Council Plan selected Demand Voltage Reduction (DVR) for its low-cost, high impact energy savings.
- DVR has the potential to be used **daily** to reduce energy use in periods of high prices.
- The key to Demand Flexibility is to follow prices – reduce loads when prices are high, do not reduce loads when prices are low.

Forecast of Average Future Mid-C Electricity Prices



Challenges & Opportunities of Daily DVR

- Low uptake of the Conservation Voltage Reduction (CVR) measure.
- Loss of revenue is lessened with Daily DVR in comparison to CVR.
- Daily DVR offers load management product to customers.
- Attractive energy product that fits well with BPA energy needs.
- Chosen as a response to acquire at least 300 MW per hour of energy-related DR by 9/30/26 (as stated in the 2022 BPA Resource Program and 2021 Regional Power Plan).

DAILY DVR MEASURE:

1. Measure Description
2. Measure Features
3. Measure Requirements
4. M&V Approach

Daily DVR Measure Description

- Hybrid demand response (DR) and energy efficiency (EE) measure.
- Reduces voltage at pre-established times of the day and specific months of the year when BPA's needs are greatest.
- Offered to BPA customers to reduce energy use at periods of peak prices and highest BPA energy needs.
- Implemented through the Custom Option 1 or Custom Option 2 within BEETS, with accompanying tools (such as a savings calculator tool) as needed.

Daily DVR Measure Features

Measure name:	Daily DVR
Measure type:	Protocol
Operated:	<u>Up to</u> 5am to 10am & 4pm to 10pm in July – April, measured annually
Measure life:	1 year
Incentive rate:	\$0.025 / kWh
Annual incentive payment:	Based on measured annual energy savings
Allowed to not operate (O&M issues):	As many days as needed
Minimum daily average voltage reduction:	2%
Maximum recommend daily average voltage reduction:	4% (primary), 6% (with Advanced Metering Infrastructure - AMI - robust voltage data)

Daily DVR Measure Requirements

- SCADA system or equivalent with capability to store interval data in a database.
- Appropriate substations serving predominantly residential or commercial loads.
- 1 or 5 minute average interval recordings at the substation bus: Volts, Current, Real Power (kW), Reactive Power (kVAR with sign, leading or lagging), Apparent Power (kVA), and end of line primary per phase voltage.
- This electronically recorded data will be submitted to BPA at least once per year to be used in calculating annual energy savings.
- Voltage always remains within the Range A of the ANSI C84.1 standards.

Simplified CVR Protocol M&V Approach

Use the established CVR Approach

Daily Avg voltage reduction calculation:

1. Average voltages at the substation bus and at the end of line metered location during non-DVR operation.
2. Do the same during the hours of DVR operated in that calendar day.
3. Daily Avg voltage reduction is the difference between those two values. This is performed each day of DVR operation.
4. Daily Avg voltage reduction % is : $[\text{Avg V (non-DVR)} - \text{Avg V (DVR)}] / \text{Avg V (non DVR)}$.

CVR Factors

Use Simplified CVR-factors from the look up tables, per heating zone and by load mix
In practice, these range between ~0.30 and ~0.60 (% energy savings) per (% voltage reduction).

Simplified CVR Protocol M&V Approach

Daily Energy Savings:

1. Gross energy metered at the substation for each calendar day.
2. Daily Energy Savings = Daily gross energy (kWh/day) x Daily V reduction % x CVR-factor x (1.04).
3. The 1.04 term is to add no-load losses reduction (energy savings) from all distribution transformers served by the subject substation.
4. Annual energy savings = sum of all daily savings. This allows for days when DVR was not executed.

Data recording requirements:

- Recording interval shall be 5 minute or less and synched to the top of the hour.
- Record total real energy delivered by the substation (kWh).
- Record three phase voltages, by phase, at the substation.
- Record three phase voltages at end of 3-phase feeder sections.
- Submit electronic data to BPA annually to document Daily DVR energy savings.

MARKET POTENTIAL:

1. Design Considerations
2. Targeted Customers

Product Design Considerations

Daily DVR is customer-centric

Customer Challenges/Pain Points	Mitigation Strategy
Voltage reduction is not suitable for all substations	BPA will facilitate technical support
Perception that voltage reduction can damage equipment (“regulators”) and increase O&M	BPA will educate Customer’s managers and technical operators
Implementation may require upfront investments	Potential upfront investments may be partially or fully offset by the incentives
Potential loss of revenue from energy savings	Daily DVR mitigates revenue loss with incentives; savings from demand charges or energy sales; asset management
Voltage reduction requires a cross-functional implementation team	The BPA team is cross-functional and experienced with DVR and CVR

Targeted Customers

Desirable Substation Attributes

Non-rural substations

Res & light
commercial end loads

Updated SCADA
systems

Some experience in
DR



Distribution Planning Considerations

Capacity constrained
feeders

Voltage readings at the
higher end of Range A
ANSI standard
(114 to 126V)



**Ideal
Pilot
Customer**

THANK YOU