2020 PowerDirect® Automated Demand Response Program Procedures Manual

Sacramento Municipal Utility District

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SMUD®

SMUD
PowerDirect® Program

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1.0 Introduction

SMUD's automated demand response (ADR) program (PowerDirect®) can help your business control its energy use by integrating automated demand response capabilities into your energy management system for controlling lighting, HVAC systems, and process loads.

The document contains the program policies and procedures associated with the participation in the program for planned load reductions during ADR conservation events.

Please note that changes to incentives and the program rules may occur between revisions of this procedures manual.

2.0 Program Overview

PowerDirect® provides incentives and technical assistance for non-residential customers to install and / or program equipment at the customer's facilities that allows for automated demand response load reductions without customer intervention. The program's purpose is to temporarily reduce electrical load by enabling a sequence of operations that executes predetermined load shed strategies. The PowerDirect® program pays customers to reduce electrical demand when needed by SMUD for economics and grid reliability. When SMUD needs the load reduction, customers receive a signal via the OpenADR communications protocol. ADR is intended to provide a fully automated process using secure Client/Server architecture between SMUD's demand response automation server (DRAS) and the customers virtual end node (VEN).

PowerDirect® is active June 1 through September 30th. Load reduction events are most likely to occur during periods of hot weather and can last from 1 to 4 hours.

PowerDirect® pays customers for load reductions and provides financial assistance for control upgrades associated with participating.

The minimum load reduction needed to participate is 50kW and 5% of peak period demand. Typical load reduction measures include:

- HVAC temperature set point adjustments
- Lighting power or scheduling adjustments

- Variable frequency drive (VFD) reductions on Pumps/motors/irrigation
- Industrial/manufacturing process load curtailments
- Electric vehicle charging load curtailments

Customers are eligible for a technology incentive to help pay for the enabling technology.

Customers are also eligible for recurring capacity payments for their ability to respond to load curtailment events.

Customers interested in learning more should complete the statement of interest located at www.smud.org/powerdirect or contact either their SMUD Strategic Account Advisor or the SMUD PowerDirect® Program Manager.

3.0 Program Participation Requirements

PowerDirect® is open to non-residential customers who:

1. Receive electric services from SMUD.
2. Have a SMUD interval meter installed at the site(s).
3. Can reduce load by 50kW (in aggregate) and at least 5% of peak demand
4. Have an existing SMUD account with 12 months of billing and usage history. A 24 month billing and usage history is needed for customers with intermittent loads, i.e. pumping and irrigation.
5. Sign a PowerDirect® participation agreement with SMUD and commit to installing automated demand response technology within 6 months.
6. Maintain an OpenADR 2.0A or B compliant controller in continuous communication with SMUD's demand response automation server.
7. Work with SMUD or its consultants to define demand response load reduction measures that can be programmed into the building's BMS or equipment controls.
8. Participate in conservation day events by allowing the control strategies to automatically respond to SMUD's demand response signal.

4.0 Aggregator Participation Requirements

In a situation where an aggregator is working with a customer, the aggregator does have the option to pull the event notification OpenADR signal from SMUD's demand response automation server and then have the customer pull the event notification signal directly from the aggregator. The aggregator is responsible for

the committed load reduction for each participation agreement and assumes the risk of customer non-performance.

Aggregator will need to submit a signed letter of authorization from the customer that includes:

- Authorization for aggregator to sign contract(s) on the customer's behalf
- Data sharing authorization for SMUD to share usage history, interval data, billing history, and PowerDirect ® performance data.
- List of sites/facilities/stores
- Effective authorization date and termination date
- Recipient of technology incentive
- Recipient of annual capacity payments

5.0 OpenADR Technology Requirements

1. Each customer site must maintain an OpenADR 2.0A or 2.0B certified virtual end node and able to connect to the SMUD demand response automation server (DRAS) OpenADR 2.0A or 2.0B virtual top node.
2. Technology must have previously demonstrated ADR capability.
3. Technology must be new and under manufacturer warranty for a minimum of three years.
4. Software and programming required for local hardware controls or local facility energy management systems (EMS) for enabling local ADR strategies at the facility site are eligible to receive an incentive to partially offset the cost.
5. Technology must be programmed to poll the SMUD DRAS on a 60 second interval.
6. Virtual end node must have continuous access to the internet.
7. ADR-enabling controls for advanced energy storage and electric vehicles (EV) are eligible for ADR incentives. The advanced energy storage systems or vehicle charger itself is not eligible but implementation of the ADR controls is an eligible cost. Eligible ADR kW will be determined by the portion of the advanced energy storage system that is partitioned to be available for DR events.

6.0 Enrollment Steps

6.1 SMUD's PowerDirect® AutoDR Program Statement of Interest

Customer demonstrates interest in PowerDirect® participation and wants to proceed with an opportunity assessment to identify recommendations and financial incentives that may be available through the full participation in this program.

6.2 Opportunity Assessment

The opportunity assessment estimates the feasibility, magnitude and cost of potential load reduction strategies. It is conducted either by SMUD staff or a SMUD contractor. The cost estimate for controls modifications is typically provided by the customer's contractor. Load reduction capability from the opportunity assessment is used to prepare a PowerDirect® participation agreement. A meeting will be scheduled at this step in order to explain the PowerDirect® program, clarify expectations, and determine if there is adequate load, energy management capability, and enough interest to support moving forward in the enrollment process. Customer is encouraged to include facilities manager and other key decision makers in the meeting. Screening information gathered to determine eligibility may include the following:

- Peak Demand
- Facility Size
- Meter interval data – used to determine availability of kW for load reduction
- HVAC controls and mechanical equipment specifications
- Customer willingness to curtail loads

6.3 ADR Audit Review

The audit review summarizes the available information on the proposed PowerDirect® project. ADR audit review may include the following:

- Project summary with project background, building type with associated loads, and load shed measures
- PowerDirect® recommended load shed and program incentive estimates for each service point, inclusive of annual capacity payment and one-time technology incentive
- PowerDirect® review methodology that analyzes demand profile between hours of 2 – 6PM
- ADR technology incentive amount
- Site description
- ADR measures
- Snapback concerns with recommended mitigation strategies
- Customer Baseline and day-of adjustment recommendation

6.4 Signed PowerDirect® Participation Agreement

During this step, customer has decided to enroll in PowerDirect® and has chosen the load reduction measures that will be installed and commissioned onsite. The

agreement is effective on the Customer signature date for one year followed by an automatic renewal. Customer understands that OpenADR systems (i.e., including, but not limited to, energy management systems, lighting controllers, OpenADR VEN, and other load management systems) will be installed in customer's participating facilities within 6 months of the effective date of the agreement to be eligible for technical assistance and technical incentives.

6.5 Technology Implementation & Completion

Customer provides SMUD with construction start date and estimated completion date to ensure project is completed within 6 months. If additional time is needed, Customer can provide a written request to SMUD's Program Manager requesting additional time. Extensions may be granted at SMUD's discretion. Customers must make good faith effort to continually make progress towards completion of project installation. It is understood that if project is not making reasonable progress towards completion, the Participation Agreement is subject to cancellation.

6.6 On-site Load Verification Testing

Once technology has been installed, commissioned, and is completely operational, SMUD program manager schedules an on-site load verification test with SMUD's third party contractor. The test events are scheduled so that the conditions on test day matches an actual DR event as closely as possible. Test events comply with the following rules:

- Test events may be scheduled up to two weeks in advance upon successful connectivity to the SMUD DRAS as confirmed by SMUD
- Project invoices are to be submitted one week before scheduled test event
- Minimum two-hour test duration
- Test events are scheduled for afternoons during the relevant demand response program window in warm weather, for weather-dependent loads, and Monday through Thursday afternoons for occupancy-dependent loads.
- The kW load reduction/increase measured during the test event must be within 25% of the approved kW load calculated. If the measured load reduction is outside of that window, SMUD will investigate the cause and make recommendations. A second test may be scheduled.

On test day, SMUD and/or its representative will request to inspect the following equipment to verify installation prior to start of test:

- All automation controls and OpenADR equipment are located, and proper installation is verified. Photos are taken as applicable.

- Pre-test site conditions are recorded and measured to include, but not limited to, foot-candles, temperatures, motor frequencies, etc.

During the event and upon completion of the two-hour test, additional observations will be made to verify the sequence of operations impact on the facilities conditions (the same observations as pre-test conditions apply).

7.0 Technology Incentive Structure

Incentive Basis: The technology incentive of $125/kW is applied to the average of the two highest consecutive hours in the load reduction table. If the second hour load reduction commitment (LRC) is less than 50% of the first hour, the technology incentive will be based upon the highest four-hour average to reflect the reduced availability of load.

Multiple Accounts: Multiple metered accounts serving a single customer are commonly aggregated into a single agreement and load reduction commitment (LRC) table. The maximum technology incentive is applied to the aggregated 2-hour commitment in the LRC table. The accounts can not apply for separate technology incentives to take advantage of non-coincident peaks.

Forfeit Technology Incentive: The technology incentive is paid with the expectation that the recipient will make a good faith effort to participate in every conservation event called within 12 months of the signature of the participant agreement. This expectation can straddle two seasons if the participation agreement is signed during the PowerDirect® season. Customers who fail to participate for 12 months shall return the technology incentive.

8.0 Test Events

SMUD will schedule a preseason test event or when not possible an early season test event. The tests are designed to:

- Confirm functionality of OpenADR communications
- Confirm that customers equipment responds at some level to load reduction measures

SMUD will provide adequate email notification of test event days and will be available to provide technical OpenADR support leading up to a test event.

- Customers that don't opt out of the test will be advised of operability or performance concerns
- Preseason test is not included in seasonal realization rate
- Early season test (after June 1) performance will be included in seasonal realization rate calculation

9.0 Capacity Payment Calculation and Realization Rates

Capacity payments are calculated monthly and paid at the end of the PowerDirect® season. The $5/kW monthly capacity is based upon the average of the highest two consecutive hours in the Minimum Dependable Load Reduction Program Hourly Load Profile (kW) table.

SMUD's demand response automation server (DRAS) is programmed with a load reduction commitment for each hour of an event as tabulated in the Minimum Dependable Load Reduction Program Capacity Commitment (kW) table. (see figure 9.1) The customer event realization rate is the sum of the actual kW reduction realized across all hours of an event divided by the sum of the hourly kW commitments. The seasonal realization rate, which is the average of event realization rates during the current PowerDirect® season, must be greater than 50% to receive the annual capacity payments.

All conservation event performances, exclusive of an opt out, will be included in the seasonal realization rate. A non-performance will be reflected as a "0%" and will be included in the seasonal realization rate.

Minimum Dependable Load Reduction Program Capacity Commitment (kW)

	June	July	August	September
Capacity Payment Basis: highest average 2-hour load shed commitment by month 2pm – 6pm, Monday - Friday	400	447	440	419
Capacity Payment	$2,000	$2,235	$2,200	$2,095

Minimum Dependable Load Reduction Program Hourly Load Profile (kW)

Hour Ending	June	July	August	September
3 pm	393	431	420	398
4 pm	318	349	339	353
5 pm	279	287	283	312
6 pm	226	279	270	264
4pm	407	478	451	442
5pm	327	371	367	389
6pm	285	356	347	322
5pm	425	476	466	473
6pm	374	419	413	365
6pm	473	495	497	437
Peak Demand	1,865	1,980	1,806	1,752

*If the load reduction potential for one hour is 0 kW, it will be recorded in the SMUD DR server as 5 kW

Figure 9.1 Minimum Dependable Load Reduction Program Capacity Commitment (kW)

10.0 Conservation Event Participation Requirements

In order to qualify for each monthly capacity payment a customer/aggregator must meet the following:

- Customer's OpenADR 2.0 virtual end node (VEN) is actively communicating with SMUD's DRAS and customer is available for an event.
- Customer's SMUD meter realizes quantifiable load reduction for each conservation event in a month without manual intervention.
- Customer does not send an opt-out response for the entire month.
- Customer investigates and remediates communication issues and underperformance issues in a timely manner.

11.0 Customer Baseline (CBL) Calculation

To determine customer load reduced during a conservation event, a baseline is established to measure performance and calculate monthly incentives.

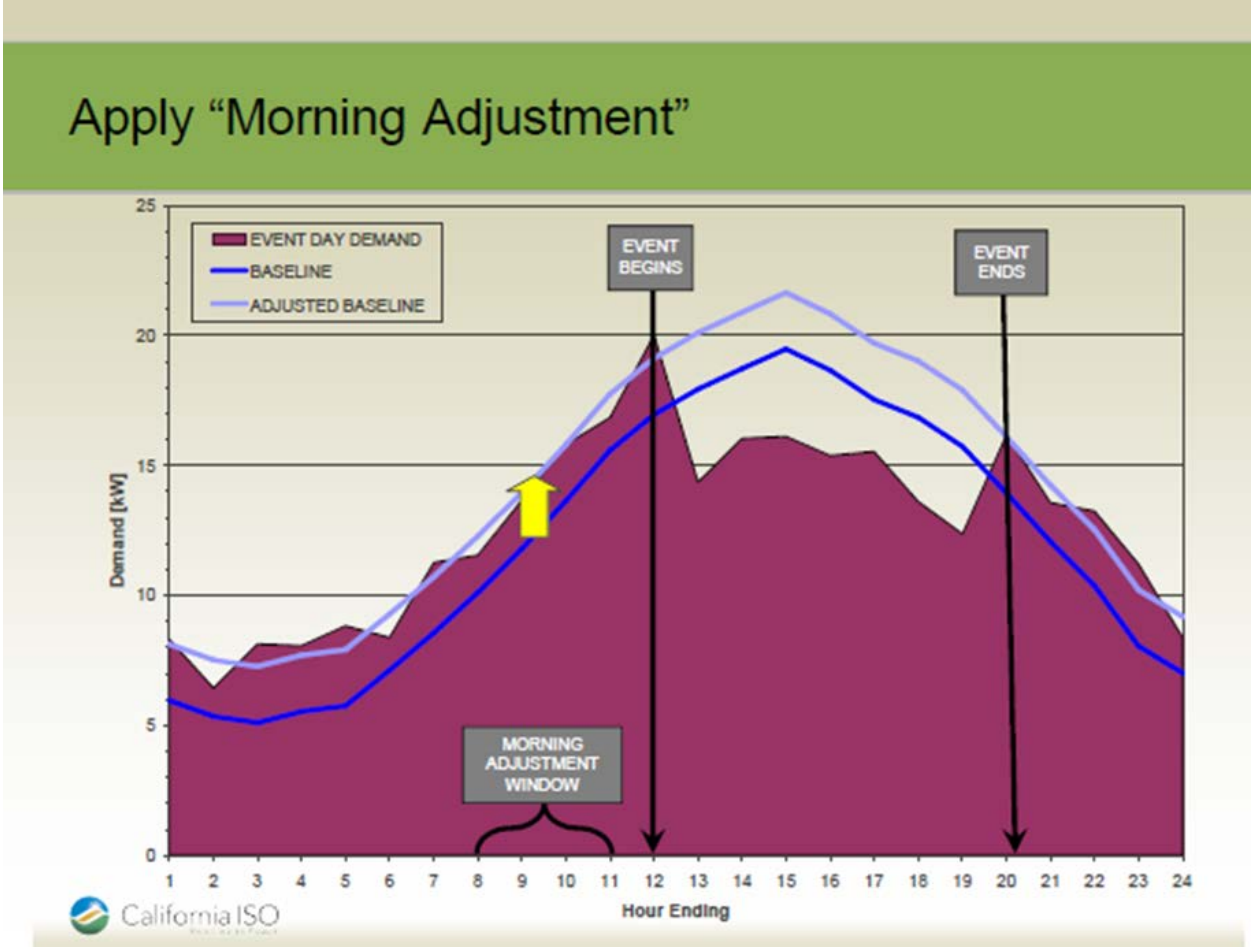
The standard SMUD baseline is called a "10-in-10" baseline. This baseline is typically applied to commercial properties with predictable weather dependent load shapes.

Industrial facilities and other non-weather dependent customers may be assigned an alternative baseline.

The 10-in-10 with a day-of adjustment baseline: Features of the 10-in-10 baseline include:

- The baseline is the hourly load that the customer would have in the absence of a DR event and is calculated from the 10 previous business days, also known as 10-in-10 or unadjusted 10-day average.
- The actual load during a conservation event is subtracted from the calculated baseline for each hour to determine customer performance.
- The 10-in-10 is calculated using a 10-day rolling average usage profile of the immediate past 10 days prior to an event, exclusive of holidays, conservation events, and weekends.
- Weather dependent loads, i.e. HVAC cooling loads, may require a "day of" adjustment to the calculated baseline, also known as an adjusted 10-day baseline. An adjusted 10-day baseline is calculated using the first 4 hours of the six hours prior to the conservation event. Adding the difference between the adjustment period load of the event day and unadjusted 10-

day baseline to the event period of the unadjusted 10-day baseline yields the adjusted 10-day baseline. See figure[1] below for example.



12.0 Conservation Event Day Dispatch Notification

SMUD notifies participating customers of events via email, utilizing a global address list comprised of designated individuals at the site.

SMUD will provide notification either the day before or the day of the event, at least 30 minutes prior to the event.

[1] Customer Baseline Load Review and Recommendation. California ISO & Utility Integration Solutions, Inc. May 26, 2009

13.0 Opting Out of a Conservation Event

If notified at least one hour before a conservation event, customer can opt out by:

1. Customer setting client status (if available in customer's system) to "opt out", or
2. Contacting the SMUD PowerDirect® Program Manager by phone 916-732-6950, or
3. Contacting SMUD Advanced Energy Solutions Supervisor by phone 916-732-6359

14.0 Conservation Event Day Limits

- Events last from 1 to 4 hours
- Events 2 hours and longer are limited to a maximum of 3 consecutive business days within a 14-day period.
- Limited to 12 conservation day events longer than 2 hours.
- There is no limit on consecutive conservation day events lasting 2 hours or less.
- Notifications for events will be provided by email no less than 30 minutes prior to the event.
- Opting Out – program participants may choose to not participate (opt out) of any event. However, opting out of an event will result in the loss of the capacity payment for that month. Opting out for a second month will result in the loss of all capacity payments for the season.

15.0 Appendix: Agreement terms and conditions

The following are the terms and conditions included in the PowerDirect® Agreement.

This SMUD PowerDirect® – Automated-Demand Response Program Participation Agreement ("Agreement") is between the Sacramento Municipal Utility District ("SMUD") and the Customer noted in the Customer Signature Block ("Customer"), singularly referred to herein as a "Party," collectively as "Parties". The Agreement is effective on the Customer signature date for one year following with an automatic renewal or terminated based on the process in "13 Termination".
WHEREAS, SMUD will be serving commercial customers with PowerDirect®, an automated demand response program (hereafter "PowerDirect®"); and
WHEREAS, the PowerDirect® Program is designed to allow SMUD to directly initiate load reductions deemed acceptable by participating customers on designated Demand Response events; and
WHEREAS, the PowerDirect® Program will schedule and provide notification of load reduction events (hereafter "Events"), and performance analytics through an Internet-based demand response management system (DRMS); and
WHEREAS, the demand response management system will interface with a participating customer's building's energy-management system (EMS), or lighting and HVAC control systems, and other predetermined loads to achieve automated electric load reduction.
NOW THEREFORE, the Parties wish to establish the terms and conditions for Customer participation in the SMUD PowerDirect® Program. Customer understands and agrees to the following terms and conditions:

1. PowerDirect® performance requirements, participation requirements and financial compensation defined in Attachment A.

2. Load Reduction Profile. Customer's electric load reduction capability will be calculated by the PowerDirect® Program and is documented in Attachment A.

3. Demand Responsive Systems. Customer understands that the PowerDirect® Program is for automated load reduction and requires that OpenADR 2.0A or B certified demand responsive systems (i.e., including, but not limited to, energy management systems, lighting controllers, OpenADR virtual end nodes (VEN) or gateway, and other load management systems) be installed in Customer's participating facilities within 6 months of the effective date of this Agreement to be eligible for technical assistance and technical incentives.
4. Ownership of Systems. The installation, purchase, and maintenance of these demand responsive systems are Customer's sole responsibility and are the sole

property of Customer. The PowerDirect® Program technology incentives available to Customer are outlined in Attachment B.

5. Internet. Customer must maintain a high-speed connection for the Internet (DSL or equivalent), and e-mail capabilities. Customer is solely responsible for installation, monthly service charges and maintenance of all necessary Internet access required for participation in the program.

6. Access to Customer Premises. Customer grants SMUD and its contractor(s) reasonable access to Customer's premises/facilities to assess systems, monitor and gauge facility performance, and the effects of the control strategies on facility occupants under the PowerDirect® Program.

7. Involuntary Emergency Event. If during a PowerDirect® Event a Customer experiences an involuntary curtailment event (power failure), that event will be reflected in the capacity payment calculation as if the full contracted load reduction was realized for that event.

8. Meters. Any PowerDirect® Event under this Agreement shall be from a metered delivery point located in SMUD's service territory. Customers who wish to view their building's detailed load shape can enroll in the Energy Profiler Online program, available without charge to PowerDirect® customers.

9. Customer Capacity Payment. Customer capacity payments, if applicable, will be posted no later than 60 days or the 2nd billing cycle following the end of the demand response season. SMUD and/or its agent's determination of the baseline, contracted capacity and curtailed load shall be conclusive. In lieu of bill credit, payment may be made by check, at SMUD's sole discretion. Compensation will be determined according to a program payment calculation in Attachment A.

10. Compensation Under One Program. Electric demand reduction achieved through this Agreement shall not be eligible for compensation under any other SMUD program.

11. Customer Self-Generation. Customers with self-generation may participate in the PowerDirect® Program under the following conditions:

a. Eligibility: Customers must take electric service from SMUD under a business rate.

b. Baseline and Settlement: The baseline and settlement calculations will only recognize demand recorded at the meter(s).

12. Fossil-Fueled Backup Generators: On-site fossil fueled backup generators cannot be used to satisfy building loads during a demand response event without prior approval from SMUD.

13. Term and Termination. The initial term of this agreement is one year and will renew automatically until termination. Either Party may terminate this Agreement with thirty (30) day written notice to the other Party. In the event of a default by either Party, the non-defaulting Party may terminate this Agreement upon ten (10) days prior written notice. Upon termination, SMUD will have the right to remove any SMUD- owned (or SMUD contractor owned) equipment and/or discontinue any SMUD provided services required for participation in the PowerDirect® Program. If the Agreement is terminated by either Party during the first year of the Agreement, Customer will reimburse SMUD for any incentives received for the purchase and/or installation of the demand responsive systems.

14. Amendments. SMUD reserves the right, at its sole discretion, to amend the terms of this Agreement. SMUD will notify Customer in writing of the amendment, which will become effective as of the amendment effective date stated in the notice. If Customer objects to the amendment, Customer may terminate this Agreement pursuant to Section 13.

15. Release. CUSTOMER AGREES TO ASSUME ALL LIABILITY FOR, INDEMNIFY, AND TO HOLD SMUD HARMLESS FROM AND AGAINST ANY CLAIMS, INCLUDING ATTORNEY'S FEES AND COURT COSTS, FOR PERSONAL INJURY (INCLUDING DEATH), PROPERTY DAMAGE, AND/OR LOSS OF BUSINESS CAUSED BY CUSTOMER'S DECISION TO ALLOW INITIATIATION OF DEMAND RESPONSE BASED ON THE OPENADR SIGNAL FROM SMUD AND REDUCE ELECTRICAL LOAD UNDER THE POWERDIRECT® PROGRAM. UNDER NO CIRCUMSTANCES SHALL SMUD BE LIABLE TO CUSTOMER OR TO ANY OTHER PARTY FOR DAMAGES OR FOR ANY LOSS, WHETHER DIRECT, OR INDIRECT, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY RESULTING FROM ANY REDUCTION OF ELECTRIC SERVICE UNDER THE POWERDIRECT® PROGRAM.

16. Rates, Rules and Regulations. This Agreement shall be subject to all of SMUD's applicable Electric Rates, Rules and Regulations, as amended from time to time, and shall at all times be subject to such changes or modifications as directed by the SMUD Board of Directors. Customers on the Temperature Dependent Pricing (TDP) Rate are not eligible to participate.