

Automated Demand Response Project Implementation Guidebook

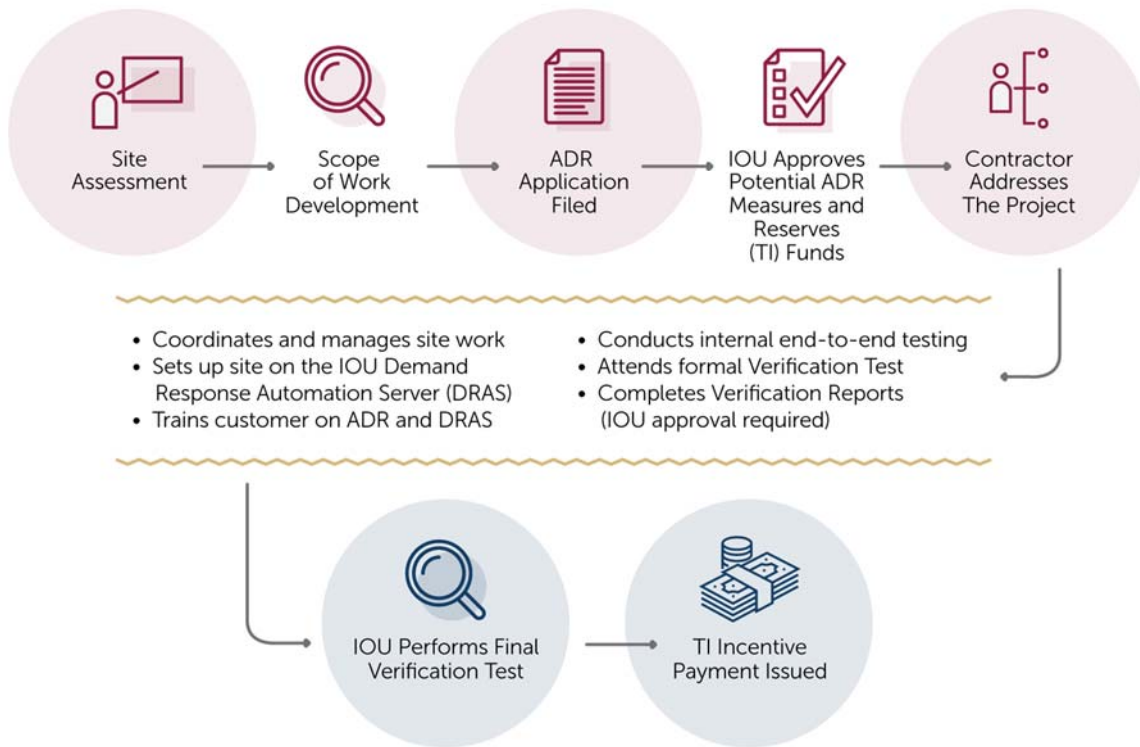
Pacific Gas and Electric (PG&E) and Southern California Edison (SCE) Service Territories



I. Purpose

This guidebook is intended to help electricians and contractors (“contractor”) with the development, installation and commissioning of an automated demand response (Auto-DR) project in Pacific Gas and Electric (PG&E) or Southern California Edison (SCE) service territory.

Auto-DR Project Development Life Cycle



II. Pre-installation

ESTIMATED COMPLETION TIME – 2-4 WEEKS

When a contractor begins an Auto-DR project, an assessment of the existing conditions is required to determine the scope of work required for successful enablement of Auto-DR.

1. Site Assessment

In general, two likely scenarios will be encountered with respect to the existing equipment at the customer site.

1. Existing equipment is not Auto-DR capable.
2. Existing equipment is Auto-DR capable, but not enabled.

It is important for the contractor to document the existing conditions and equipment as thoroughly as possible. Following are examples of items that should be documented.

Lighting System

- Equipment manufacturer and model
 - Is the equipment Auto-DR capable? If not, what is needed to make it capable (e.g., firmware upgrade, new lighting controller)? If you are unsure, contact the equipment manufacturer.
- Controller locations and quantity
 - How many lighting controllers are there and where are they located? Are they networked together?
- System layout
 - Does the lighting controls layout consist of a single system?
 - Does the lighting system cover all areas of the building/facility?

HVAC System and Thermostats

- Thermostat manufacturer and model
 - Are the thermostats Auto-DR capable? If not, what is needed to make them capable (e.g., firmware upgrades, new thermostats)? If you are unsure, contact the thermostat manufacturer.
- Thermostat locations and quantity
 - How many thermostats are there and where are they located?
- System layout
 - Are the thermostats integrated into an energy management system (EMS)?
 - Does HVAC serve the entire facility?
 - Are there critical areas where HVAC cannot be curtailed?

Internet Connection

- Does the facility have an existing internet connection?

- Is the internet connection Wi-Fi enabled? Does the Wi-Fi signal reach all areas of the facility?
- Identify locations of internet ports.
- Does the facility have any specific IT security requirements?

2. Scope Potential DR Measures and Auto-DR Controls Configurations

With the existing equipment in mind, determine the DR strategies (i.e., light dimming and/or space temperature reset) that can be implemented at the site, and scope out the potential Auto-DR controls configurations based on those measures. The following are items to address at this stage.

- Does the existing equipment have integrated virtual end nodes (VENs) that can initiate Auto-DR? Or, is a new VEN required for existing equipment (e.g., Universal Devices Inc. client)?
 - Where will the new VEN(s) likely be located in relation to existing equipment and controllers?
 - How many VENs will be required?
- How will the VEN connect to the internet?
 - Will the VEN connect to the existing internet connection?
 - Will it require its own dedicated internet connection?

3. Engage Customer to Identify Potential DR Measures

Discuss potential DR strategies with the customer to determine which are acceptable based on building operations. Consider occupant spaces where lighting or temperature cannot be adjusted and avoid selecting aggressive DR strategies to prevent program fatigue and occupant discomfort. This step will help ensure that the customer can participate consistently and be comfortable in future DR program participation.

There are a variety of options for lighting and thermostats. Eligible DR strategies for the SCE Auto-DR Express/PG&E Auto-DR FastTrack Program are provided below.

- Deemed Lighting Measures
 - 20% dimming
 - 30% dimming
 - 40% dimming
- Deemed HVAC Measures
 - 4°F space temperature reset
 - 5°F space temperature reset
 - 6°F space temperature reset

4. Calculate Load Shed Estimates

Once Auto-DR measures are selected, the load shed estimate(s) associated with each measure can be calculated using the applicable SCE or PG&E calculation tool. At a minimum you must provide the following information.

- Facility type
- Facility ZIP code (or climate zone)
- Facility maximum kW (demand based on the most recent 12 months of usage)
- Percent of the facility participating in DR (PG&E only)
- Selected Auto-DR measures
- The SCE Auto-DR Express and PG&E Auto-DR FastTrack calculation tools are at
 - [SCE Auto-DR Express Technology Incentives Calculator](#)
 - [PG&E Auto-DR FastTrack Calculation Form](#)

5. Assist Customer in Selecting the Best-Fit Demand Response Program

Demand response programs offer varying levels of incentives and have different participation requirements. At this step, it is essential to leverage the customer's load shed potential and operation requirements to determine the demand response program that best fits their facility and operations. Keep in mind that the customer must remain enrolled in a qualifying DR program for a period of three years after receiving Auto-DR incentives.

The SCE Auto-DR Help Desk and PG&E Auto-DR Team can provide customer assistance and resources to facilitate DR program selection and enrollment. Contact information can be found in the Resources section of this document.

6. Develop the Scope of Work (SOW)

Upon completing the previous steps, the contractor will have collected sufficient information to develop a SOW for the customer. The SOW should include a concise summary of the following.

- The customer service account(s) relevant to the project
- Customer approved Auto-DR measure(s)
- Load shed estimate(s) per measure (from the SCE Auto-DR Express or PG&E FastTrack calculation tools referenced in Step 4)
- Estimated equipment and installation costs
- Projected incentives (also from the SCE Auto-DR Express or PG&E FastTrack calculation tools referenced in Step 4)
- High-level Auto-DR controls configuration/architecture
- Proposed demand response program of enrollment (if not yet enrolled)

The completed SOW should be signed by the customer to ensure that the customer is fully aware of the work to be performed, estimated costs and future DR participation requirements.

7. Complete and Submit Utility Technology Incentive Application

Upon customer approval of the Auto-DR project scope, the contractor and/or customer must fill out and submit an Auto-DR program incentive application with the appropriate utility. This is the first step in securing incentive funds that can be used to offset the equipment and installation costs associated with the Auto-DR implementation. Due to differences in program structures, this process can vary slightly between utilities. The following provides a general summary about how these applications should be filled out for SCE and PG&E.

SCE Auto-DR Application

The [SCE Auto-DR application](#) must be filled out and submitted online. Keep in mind that before filling out the application, the applicant must register for an Energy Management Online Application Tool Account. After registering for this account, the user can go on to complete and file the application. It is important that the user select the Auto-DR Express Technology Incentives option. The Auto-DR Help Desk can assist with questions regarding the application process.

PG&E Auto-DR Application

PG&E recommends that the customer and/or contractor contact a PG&E representative prior to submitting an [Auto-DR Application](#). The PG&E Auto-DR Team is also a resource that can assist in completing and submitting the Auto-DR application. The Auto-DR Team contact information is provided at the end of this document.

III. Installation

ESTIMATED COMPLETION TIME – 2-4 WEEKS

The utility will conduct a review of the submitted project application and set aside incentive funds based on utility-approved load shed estimates. The funds are calculated at the utility-specific incentive rate per kilowatt (kW) of load reduction. Once these funds are reserved, the contractor and/or vendor will receive the notification to proceed with installation of the Auto-DR enabling equipment. Funds are reserved for a period of one year during which it is expected for the Auto-DR controls to be fully installed and commissioned. The following sections outline the major milestones in an Auto-DR implementation that can be expected for the successful installation and commissioning of Auto-DR controls.

In general, the Auto-DR programs cannot provide incentives for equipment or labor costs accrued prior to the time the notification to proceed is issued. To mitigate a potential situation in which project costs may be deemed ineligible for incentives, it is recommended that installation initiates only after utility approval is issued.

1. Install the Auto-DR Enabling Equipment and Controls

During installation, the contractor will ensure the following steps are taken.

- Install the necessary controls, wiring and software to enable Auto-DR on existing thermostats and/or lighting controls as identified in the SOW. In some cases where Auto-DR capable equipment does not exist, contractor will install new Auto-DR capable equipment.
- Install and integrate VEN(s) to thermostats and/or lighting system controllers (where applicable).
 - The integration of the VEN consists of configuring the Auto-DR controls such that load shed measures (i.e., lighting dimming and/or space temperature reset) are initiated by the VEN.
- Perform controller and equipment programming of selected measures.
 - It is important to ensure that the programmed lighting dimming and/or space temperature reset points are in line with what was submitted in the project application and agreed to by the customer. Any change in project scope may necessitate revision of the submitted project application and re-review of the load shed estimates.
- Set up communication between VEN (external or embedded) and utility demand response automation server (DRAS)/virtual top node (VTN).
- When the project installation is nearing completion, the customer or contractor should request the customer-specific DRAS credentials from the utility so that VEN communication with the DRAS can be established.

The actual Auto-DR project installation may deviate from the original scope. It is important to document any changes in scope keeping in mind that incentives can only be applied toward labor and equipment costs associated with the direct enablement of Auto-DR. In general, ineligible project costs include leasing/leased equipment, cloud-based controls (SCE only), metering, service contracts, recurring costs (e.g., internet service) and taxes (PG&E only).

2. Verify Communication Between DRAS and VEN

Faulty internet connections, Wi-Fi network strength and other network-related issues can impact the communications of the VEN with the DRAS. A customer's automated participation in DR is directly impacted by the VEN's ability to maintain consistent communication with the DRAS. As a result, it is important to confirm that the communication between the two devices is consistent. After VEN communication with the utility DRAS is established, verify the communication between the two is consistent by addressing the following two main points.

- Does the DRAS customer interface (accessed with the customer DRAS credentials) show that the VEN is online? If no, diagnose the problem.
- Does the DRAS customer interface show that the VEN communication with the DRAS has been consistent since it was first brought online and connected with the DRAS? This can be verified by checking the offline activity in the DRAS customer interface; the persons registered for DRAS notifications will also receive emails notifying them if the VEN goes offline. If the communication is inconsistent, diagnose the problem.

3. Test Auto-DR Controls Functionality

Utility incentives can only be disbursed after verification of Auto-DR controls functionality. It is important for the contractor to test Auto-DR controls functionality and to troubleshoot any issues prior to notifying the utility of project completion. The following provides the items to check for when testing Auto-DR controls functionality.

- **Communication Between VEN and Auto-DR Controls**
Since load shed measure implementation must be fully automated, it is important to verify that the VEN receives the load shed signal from the DRAS and that it effectively relays this signal to the Auto-DR controls. The DRAS customer interface allows the user to create test events that can be used to simulate real DR events. This feature can be used to determine that the VEN effectively relays the signal and that the controls initiate the programmed load shed sequence. Keep in mind that the utility will need to verify that the load shed initiated by the installed controls is fully automated.
- **Customer Approval of Auto-DR Measure Implementation**
Though the implemented Auto-DR measures are initially approved by the customer, in some cases after the actual implementation occurs, the customer may determine that the load shed is too aggressive and therefore not repeatable for future DR events. In other cases, the customer may decide that they would like to participate with a more aggressive implementation. Because the Auto-DR programs are intended to incentivize quality load

shed that can be provided by the customer on a consistent basis, it is recommended that a two-hour test be performed to gauge the effects of the implementation. This will ensure that the customer is aware of the effects and will provide them a window during which they can provide a revision to the intended Auto-DR measures if deemed necessary.

4. Provide Customer Training

Although the Auto-DR programs are intended to incentivize automated load shed, it is important for the customer to maintain overall management of their facility controls. Hence, it is essential for the customer be trained in the following two areas.

- **Managing and Changing Light Dimming and Space Temperature Set Points**
Though the customer may initially agree on specific Auto-DR set points, facility operators may decide to make adjustments, for example, a less aggressive lighting curtailment or space temperature increase for a specific portion of the facility. Proper training will allow the customer to make the necessary adjustments without the need for contractor involvement. This also provides the customer with the assurance that they are ultimately in control of their operations.
- **DRAS Customer Interface Features**
The customer should be familiar with the features available through the DRAS customer interface, including the ability to identify pending events, setting up test events and event opt-out function.

IV. Project Verification and Incentive Payment Processing

ESTIMATED COMPLETION TIME – 6-16 WEEKS

After the Auto-DR controls are successfully installed and commissioned, the contractor should contact the utility to schedule a verification test that lasts two to three hours. Incentives are disbursed upon completion of a successful verification test. Along with notification of completion, the utility will require itemized project invoices, installation reports and other relevant documents.

V. Resources

Following is a list of resources and contacts for the SCE Auto-DR Express and PG&E FastTrack programs.

- SCE Auto-DR Helpline
 - 1-866-238-3605
 - autodr@sce.com
- SCE Auto-DR webpage
 - sce.com/drp
- PG&E Auto-DR Team
 - 855-866-2205
 - pge-Auto-DR@energy-solution.com
- PG&E Auto-DR webpage
 - <http://pge-Auto-DR.com>