



Energy Storage Request for Offers

2016 SOLICITATION PARTICIPANTS' WEBINAR

December 15, 2016

Agenda

Topics

- Introduction
- CPUC Energy Storage Program
- Solicitation Overview
- Interconnection Information
- RA Only Capacity Storage Agreement
- CSA Overview
- BTM CSA Overview
- PSA Overview
- Evaluation Methodology
- Offer Submittal Process
- Keys to a Successful Bid
- Intermission
- Q & A

Presenter

Charlie Post
Millene Hahm
Millene Hahm
Scott Schalich
Andrew Lee
Andrew Lee
Andrew Lee
Charlie Post
Yanping Chong
Millene Hahm
Millene Hahm

Team

Q&A / List of Attendees / Audio Replay

- PG&E will not take questions during the webinar.
- Participants should email questions to EnergyStorage@pge.com during the presentation.
 - Questions will be answered at the end of the webinar
 - PG&E might not address all questions during the Q&A portion of this webinar
 - After the conference, PG&E will compile and post a Q&A document on PG&E's Energy Storage website, accessed via www.pge.com/rfo
- PG&E will post a list of attendees on PG&E's website. If you do not want your name or the name of your company published, please let us know by sending an email to EnergyStorage@pge.com by December 16
- PG&E plans to post a recording of the Webinar on PG&E's website (listed above)

Webinar Overview

- This presentation is intended to provide a summary level discussion of the information and requirements established in the RFO materials
- Participants should carefully review the Energy Storage Solicitation Protocol and all RFO materials, available on PG&E's website: www.pge.com/rfo/energystorage
- To the extent that there are any inconsistencies between the information provided in this presentation and the requirements in the RFO materials, the RFO materials published on PG&E's website shall govern
- PG&E will host a Participant's Offer Form Webinar on January 10, 2017
 - Participants should try out the Offer Form prior to the Webinar

CPUC Energy Storage Program

Summary of Energy Storage Decision

- **October 2013, CPUC issued Decision 13-10-040 on energy storage**
- **Targets in 3 grid domains, or “buckets:”**
(1) transmission, (2) distribution, and (3) customer side storage
- **CPUC Objectives:**
 - **The optimization of the grid, including peak reduction, contribution to reliability needs, or deferment of transmission and distribution upgrade investments;**
 - **The integration of renewable energy; and**
 - **The reduction of greenhouse (“GHG”) emissions**
- **All energy storage resources must be installed before the end of 2024**
- **Pumped hydro \geq 50 MW is excluded**
- **Utility ownership should not exceed 50% of all storage across all 3 grid domains**

PG&E's Procurement Targets

	2014	2016	2018	2020	Total
PG&E					
Transmission (T)	50	65	85	110	310
Distribution (D)	30	40	50	65	185
Customer (C)	10	15	25	35	85
Subtotal PG&E	90	120	160	210	580

- **PG&E's Procurement Targets per the CPUC Energy Storage Decision**
- **PG&E may procure a different MW amount through this 2016 ES RFO**
- **Flexibility among overall targets**
 - **Shift 80% of MW of T&D targets among all three domains**
 - **Must at minimum meet customer target, but capped at 200% of target**
- **Any shortfalls from prior solicitations will be rolled into future solicitations**

Solicitation Overview

RFO Schedule

DATE	EVENT
November 30, 2016	PG&E issued Energy Storage RFO
December 15, 2016	Participants' Webinar
December 22, 2016	Deadline for Participants to submit Confidentiality Agreement for access to additional PG&E-owned Distribution Deferral Asset data
January 10, 2017	Offer Form Webinar
January 31, 2017	Deadline for PG&E to receive Offers by 1:00 pm PPT (submitted via Power Advocate)
April 14, 2017	PG&E notifies Participants of their eligibility for Shortlist Negotiations
April 21, 2017	Participants notify PG&E whether they accept Shortlist position by 12:00 pm PPT
May – October 2017	PG&E and Participants negotiate Agreements
December 1, 2017	Deadline for PG&E to file Application for approval of executed Agreements

Key Solicitation Requirements

- **Minimum Size Requirements**
 - Offers at all connection levels must be at least 1 MW in size, with a maximum project size of 50 MW.
 - Multiple ES resources can be aggregated to meet the minimum size requirement.
 - The utility-owned distribution deferral asset project has a minimum size requirement of 10 MW.
 - The utility-owned assets at the PV sites have a size requirement of 4 MW.
- **Commercial Online Date**
 - PSA: Distribution Deferral Project – online by November 1, 2021.
 - All other energy storage projects must begin deliveries before the end of 2024.

2016 ES RFO – Site Control and Interconnection

Connection Level	Ownership Structure	Requirements
Transmission (T) or Distribution (D)	Third-party owned	<ul style="list-style-type: none"> • Site control required • Phase I (or equivalent) interconnection study required
	Utility-owned Stand-Alone	<ul style="list-style-type: none"> • Site control required • Phase I (or equivalent) interconnection study required
	Utility-owned Distribution Deferral Asset	<ul style="list-style-type: none"> • Site control and interconnection application <u>not</u> required at time of offer submission • PG&E has started interconnection process
	Utility-owned ES @ PG&E-owned PV Sites	<ul style="list-style-type: none"> • Site control and interconnection application <u>not</u> required at time of offer submission
Customer (C)	Third-party owned	<ul style="list-style-type: none"> • Site control and interconnection application <u>not</u> required at time of offer submission

Energy Storage Agreement Types

	Agreement Type	Configuration	Description
A	Resource Adequacy Only Agreement	Transmission or Distribution Connected	For energy storage projects that will provide RA only.
B	Capacity Storage Agreement (CSA)	Transmission or Distribution Connected	For energy storage projects that will provide RA only with an energy settlement component.
C	Behind-the-Retail Meter Capacity Storage Agreement (BTM CSA)	Customer Connected	For customer connected energy storage projects that will provide RA only with an energy settlement component.
D	Purchase and Sale Agreement (PSA)	Energy storage providing distribution deferral benefits	For the Llagas project site, to defer distribution transformer upgrades for 10 years. This turnkey project will be sold to PG&E once complete.
		Energy storage at PG&E owned PV sites	For energy storage projects to be located at the 3 identified PG&E-owned PV sites. Turnkey projects will be sold to PG&E once complete.
		Transmission or Distribution Connected Stand-alone energy storage	For a turnkey energy storage project to be sold to PG&E once complete.

CPUC Approval must be obtained for the Agreement to be effective

Credit and Collateral Requirements

Agreement Options	RA-Only / CSA / BTM Capacity Product Agreement	PSA (Distribution Deferral Asset)	PSA (PG&E's PV Generation Sites)	PSA (Stand-Alone Energy Storage)
Pre-Commercial Operation Date (COD)				
Project Development Security ("PDS")	\$15/kW within 5 days of Execution, and an additional \$45/kW within 5 days of CPUC Approval (total posted PDS of \$60/kW)	\$15/kW at Execution, and 10% of purchase price at CPUC Approval plus aggregate amount of Daily Delay Damages plus Early Decommissioning Performance Assurance prior to any earth disturbance	\$15/kW at Execution; and at least an additional \$45/kW plus \$x – for security for license for potential dismantling/de-commissioning, at CPUC Approval plus \$x – if upgrades or other modifications needed to be paid to Distribution Provider	\$15/kW at Execution, and an additional \$45/kW at CPUC Approval
Post-COD				
Delivery Term Security ("DTS")	\$125/kW (Payment Quantity) or 10% of highest estimated Capacity Payments for any 36 months, whichever is higher	10% of Purchase Price through General Warranty Period	N/A	N/A
Post Closing Collateral for Performance and Warranty Periods	N/A	An acceptable warranty by an issuer acceptable to PG&E plus 10% of the purchase price for the duration of the warranty period	An acceptable warranty by an issuer acceptable to PG&E plus 10% of the purchase price for the duration of the warranty period	An acceptable warranty by an issuer acceptable to PG&E plus 10% of the purchase price for the duration of the warranty period

Safety

- PG&E expects RFO Participants to recognize safety is of paramount importance.
- Energy storage safety requirements follow PG&E's Contractor Safety Standard pursuant to CPUC Decision (D.) 15-07-014.
- Participants are required to demonstrate during the RFO that Projects can be designed, constructed, and operated safely.
- Initial offers should identify project safety risks and mitigation plans, as well as safety record of Participant and any identified contractors.
- Demonstration of safety will progress through the RFO. PG&E will provide additional instructions to shortlisted Participants to:
 - Provide preliminary Site Safety Plan;
 - Pre-qualify consistent with PG&E's Contractor Safety Program Requirements. See: <http://www.pge.com/contractorsafety>.
- Participant's demonstration of safety and the safety of its contractors is a continuous obligation through the term of the Agreement.

2014 versus 2016 ES RFO

How 2016 ES RFO differs from 2014 ES RFO:

- **Site control required (where applicable)**
- **Phase 1 (or equivalent) interconnection study required where applicable**
- **Agreement structure (for third-party owned T&D resources)**
 - **Moving to RA Only or RA with energy settlement type agreements**
- **Project Size**
 - **Minimum is 1 MW**
 - **Maximum project size is 50 MW**
- **Evaluation methodology updated**
 - **“Portfolio’s Net Capacity Position” as new PAV adjustment**
 - **“Term and Commercial Operation Date Diversity” as qualitative evaluation criteria**

Independent Evaluator (“IE”)

- **Primary role of the IE is to:**
 - **Monitor RFO processes to ensure fair and equal treatment of all Participants**
 - **Monitor evaluation processes to ensure PG&E has implemented methodology as described and that offers are treated consistently**
 - **Report on RFO and proposed transactions to CPUC when filed for CPUC approval**
- **The IE performs an independent review of all offers**
- **The IE may review all proposal data and monitor all negotiations of Agreements**
- **IE for the 2016 Energy Storage RFO is Wayne Oliver of Merrimack Energy Group**
 - **Copy Wayne Oliver on all correspondence at waynejoliver@aol.com**

Interconnection Information

Interconnection Information

Phase I Interconnection Study or Equivalent to be submitted with CSA, RA Only CSA, and PSA – Stand Alone Offers:

Interconnection Process	Phase I or Equivalent
Independent Study	System Impact Study
Fast Track	Proof that project has passed Initial Review and Supplemental Review
Distribution Group Study	Phase I Study
Transmission Cluster	Phase I Study

Interconnection Information

For CSA, RA Only CSA, and PSA – Stand Alone Offers:

- **Point of Interconnection and its location relative to the Project**
- **Status of the interconnection studies and fees paid**
- **Summary of interconnection study results: expected costs and completion dates for facilities and network upgrades**
- **Status of obtaining FCDS / PCDS (if offering RA)**
 - **Requested status / MW (Cluster: DD/Apx 1, DD/Apx 3/Apx A&B; Independent Study: DD/Apx 6/Apx A&B)**
 - **Completed deliverability assessments**
 - **Deliverability allocated**

BTM CSA and PSAs

Behind the Meter Capacity Storage Agreement Offers

- Phase I (or equivalent) is not required from Participants
- Provide the Default Load Aggregation Point (DLAP) or if known, supply the sub-Load Aggregation Point (subLAP)

Purchase and Sale Agreements:

(1) PG&E Distribution Deferral Offer

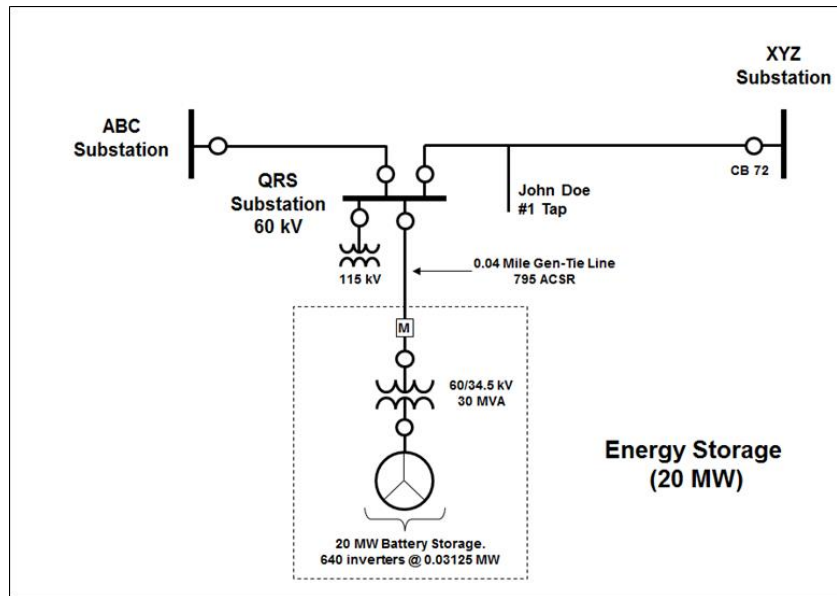
- Phase I (or equivalent) is not required from Participants
- The process for applying for an Interconnection Agreement will be handled internally by PG&E

(2) PG&E PV Sites

- Do NOT need to establish a valid and active interconnection application at the time of the Offer

Information to be Submitted for: ALL Offers

- Description of your company's experience implementing New Resources in CAISO.
- Single-Line Diagram like the example below except for Behind the Meter projects



- Chargeability Studies (not required) – if favorable, could be a positive in project viability assessment.

RA Only Capacity Storage Agreement

Transaction

- **Product: All Capacity Attributes associated with Project**
 - **System RA, flex RA, local RA, plus any future defined characteristics that can be applied to Compliance Obligations**
- **Seller does not have to bid all Product from Project—Seller commits to provide Product at Contract Quantities**
 - **Seller may sell excess amount of Product from Project to third parties**
- **Seller is Scheduling Coordinator**
 - **Seller retains CAISO revenues**
- **Payment Quantity and Contract Price: Seller bids amount and price for which it wants to be paid for delivering Contract Quantities**

Year	Contract Quantity (MW)	Payment Quantity (MW)	Contract Price (\$/kw-year)
	____ MW RA Attributes ____ MW Flex RA Attributes	____ MW (for all of Contract Quantities)	

Delivery of Product

- Seller must submit Supply Plans for the Contract Quantities in each Compliance Showing
- If entire Contract Quantities not delivered, Payment Quantity will be reduced proportionately (Confirmed Quantity)

Example

Contract Quantities	Payment Quantity
RA Attributes: 10 MW	10 MW
Flex RA Attributes: 20 MW	

If Seller delivers 10 MW of RA Attributes and 10 MW of Flex RA Attributes for a month:

$$\begin{aligned}\text{Confirmed Quantity} &= \frac{\text{Delivered Quantity (20 MW)}}{\sum \text{Contract Quantities (30 MW)}} \times \text{Payment Quantity (10 MW)} \\ &= \frac{20}{30} * 10 \text{ MW} \\ &= 6.67 \text{ MW}\end{aligned}$$

Term, Events of Default

Term

- **Seller will specify an Expected Initial Delivery Date (EIDD)**
 - **Delay beyond EIDD will be subject to delay damages and an Event of Default after 180 days**

Events of Default

- **Storage must continue to count toward PG&E's storage target**
- **Must deliver minimum threshold of Contract Quantities from Project**
 - **Seller must provide an average of at least 90% of Contract Quantity from Project over rolling 12 months and an average of at least 95% of Contract Quantity over rolling 24 months**

Capacity Storage Agreement

Transaction

- **Same as RA Only Capacity Storage Agreement, with an added Variable Settlement for every day in the Delivery Term**
- **Seller pays PG&E a Variable Settlement based on CAISO energy and ancillary services market prices**
- **Payment is made irrespective of how Seller actually dispatched in the market**
- **Variable Settlement may be adjusted depending on the resource Seller is bidding**

Variable Settlement

Variable Settlement for a day = *Confirmed Quantity* * *max (Energy, Spin, Reg)*,
where:

- Energy is based on the z highest Day Ahead Energy Price spreads in a day, with z representing the duration of the resource:

$$\text{Max } (0, \text{Highest DA Energy Price} - \frac{\text{Lowest Energy DA Price} - \text{VOM}}{\text{Efficiency}})$$

Seller bids efficiency and VOM values

- Spin is based on the 22 highest Day Ahead Spin prices in a day
- Reg is based on the sum of the z highest Day Ahead Reg Up prices and z highest Day Ahead Reg Down prices in a day, with z representing the duration of the resource

BTM Capacity Storage Agreement

Transaction

- **Same as Capacity Storage Agreement, with added provisions addressing behind-the-meter customers and a simpler Variable Settlement**
- **Variable Settlement for a day is only based on the z highest DA Energy Prices, with z representing the duration of the resource:**

= *Confirmed Quantity * Max (0, Highest DA Energy Price – VOM)*

Seller bids VOM value

PSA Overview for Llagas ES Distribution Deferral Project

DD PSA – Llagas ES Distribution Deferral Project



Project Size: 10MW / 40MWh (base bids)

- Participants can propose up to 20MW in alternate bids

Requested Online Date: 11/1/2021

Interconnection:

- Initiated interconnection via WDT
- Proposed new breaker on bank 3
- Interconnection process and facilities are not in the Seller's scope of work

Use Cases:

- Market participation (capacity, energy, A/S)
- Distribution deferral
- Site specific duty cycle specified in Exhibit F

Llagas ES: Supplemental Information Available

After participants sign a confidentiality agreement, PG&E will provide the following:

- 1) Geotechnical and geophysics report for Llagas site
- 2) Preliminary switchgear SLD, SLMR and BOM drawings
- 3) Topographical survey files
- 4) Key PG&E standard reference documents

All base bids must be 10MW/40MWh per the PSA commercial terms and per the Technical Specifications, but alternate bids are encouraged. See Appendix B7 “PSA Additional Information” for description requirements of alternate bids.

PSA Overview for Projects at 3 PG&E-Owned PV Sites

PSA - PG&E PV Site Requirements

Site	Nominal Voltage At Connection Point (see note 1)	Guaranteed Dmax (MW) at Year 1- 10 (see note 2)	Guaranteed Discharge Duration (hours)	Guaranteed Site Specific Required Duty Cycle
Gates 17115 W. Gale Ave., Huron, CA 93234	12.47kVAC	4MW	4	1 full discharge and charge per day, for 365 days per year for minimum of 10 years
Huron (see note 3) Corner of West Gale Avenue and South Lassen Ave (Hwy 269), Huron, Ca. 93234	12.47kVAC	4MW	4	1 full discharge and charge per day, for 365 days per year for minimum of 10 years
Stroud W. Kamm Ave west of S. Lassen Ave (Hwy 145), Helm, Ca.	12.47kVAC	4MW	4	1 full discharge and charge per day, for 365 days per year for minimum of 10 years

Notes:

1. The voltages listed are nominal only.
 - A. The equipment connected to the 12.47kVAC bus shall be at least 15kV class equipment, typical voltage range is from 0VAC to 13.8kVAC.
2. These values are minimum total output power for the Energy Storage Systems (ESS) at each site. Dmax of 4 megawatts is the minimum output for duration of 4 hours. This system should consist of a modular system made up of smaller units (say 500kW or 1 MW) in parallel to give the total of 4 megawatts.
3. Huron is on the west side of South Lassen Ave (Hwy 269) on West Gale Ave.

PSA stand-alone

PSA Stand-alone

- **All projects must be located in PG&E's service territory and interconnected to PG&E's Transmission or Distribution System.**
- **Site control and Phase I (or equivalent) interconnection study required at time of offer submission**

Evaluation Methodology

Evaluation Methodology

- **QUANTITATIVE CRITERIA**
 - Net Market Value
 - Portfolio Adjusted Value
- **QUALITATIVE CRITERIA**
 - Project Viability
 - Supply Chain Responsibility
 - Credit
 - Agreement Modifications
 - Counterparty Concentration
 - Technology Diversity
 - Term and Commercial Operation Date Diversity
 - Safety

Net Market Value (1)

Net Market Value = (E + A + C) – (V + F) = Benefits - Costs

- **E = Energy value** captures the value associated with the electric energy price in the CAISO markets for each Offer over its delivery term.
- **A = Ancillary Services value** is based on Offer's Ancillary Service capability.
- **C = Capacity value** is based on
 - Projected monthly quantity of Net Qualifying Capacity for System RA, and Effective Flexible Capacity for Flexible RA.
 - Offer's contribution to meeting PG&E's future Resource Adequacy requirements

Net Market Value (2)

$$\text{Net Market Value} = (E + A + C) - (V + F) = \text{Benefits} - \text{Costs}$$

- **V = Variable Cost** is based on
 - Cost of fuel (other than grid energy) and associated greenhouse gas (“GHG”) cost, variable O&M (“VOM”) for discharge, Fired Hour Charge for discharge, and/or Start-up Costs for discharge, if applicable, but does not include the market costs for Charging Energy.
- **F = Fixed Cost** is based on
 - Sum of projected monthly fixed payments (product of Payment Quantity Price and the monthly Payment Quantity specified in offer)
 - Annual fixed overhead cost, for contract administrative costs, and costs for scheduling into CAISO market if PG&E is the scheduling coordinator.
 - For PSA Offers, fixed cost will be determined by PG&E’s Cost of Service Model, which will determine revenue requirements

Portfolio Adjusted Value (“PAV”)

- **PAV modifies the NMV to account for elements that impact a particular Offer’s value in the context of PG&E’s electric portfolio**
- **PAV calculations make explicit and systematic adjustments to NMV to reflect portfolio effects and preferences that benefit PG&E customers**
- **PG&E will evaluate PAV by adjusting NMV by the following components:**
 - Location
 - Cost of Transmission Network Upgrade
 - Distribution Investment Deferral Value
 - Increased Efficiency of Fossil Generation
 - Avoided Renewable Curtailment
 - Portfolio’s Net Capacity Position
- **PAV is intended to represent the value of an Offer in the context of PG&E’s portfolio by making explicit and systematic adjustments for PG&E’s preferences on each component**

Qualitative Factors

Qualitative factors PG&E may consider include:

- **Project Viability**
- **Technology Diversity**
- **Supply Chain Diversity**
- **Credit**
- **Safety**
- **Contract Modifications**
- **Counterparty Concentration**
- **Term and Commercial Operation Date Diversity**

Offer Submittal Process

Website and Communications

- The Energy Storage RFO website (select “2016 Energy Storage RFO” link at www.pge.com/rfo) includes everything you need to submit for an offer, including but not limited to:
 - RFO documents
 - Detailed instructions for submitting offer(s) through Power Advocate
 - Announcements, updates, and Q&A
- All communications should be directed to: EnergyStorage@pge.com, with a copy to the Independent Evaluator at waynejoliver@aol.com

Offer Submittal Process – Power Advocate

- Offers must be submitted via the online platform Power Advocate.
 - In order to submit an Offer, participants *must first pre-register* with Power Advocate. The links can be found on the Energy Storage RFO website.
 - PG&E strongly encourages you to register well in advance of Offer due dates.
- Detailed instructions for submitting offer(s) and using Power Advocate are available on PG&E’s website www.pge.com/rfo under “2016 Energy Storage RFO.”
- **IMPORTANT:** Two separate Power Advocate links
 - One for third-party owned projects offers
 - One for utility-owned projects offers

Offers and Variations Allowed Per Participant

- Participants may submit up to twelve (12) Offers
 - An Offer is defined as a specific Project at a particular location, using one type of technology, and under a specific agreement type
 - Varying these attributes are substantial changes and are considered a new Offer
- Participants may submit up to ten (10) variations of each offer, including the base offer (i.e., base offer plus 9 variations).
 - A variation may alter attributes such as delivery term, price, commercial operation date, or capacity
 - For PSA Offers, additional variations may alter attributes such as duration, or operational characteristics such as cycles per day

Offer Submittal Process

- **Offers must be received by PG&E through Power Advocate by the deadline – January 31, 2017 by 1:00 PM PPT**
- **Offer package must contain complete and accurate information**
- **Offer package must contain all required information, and must be organized as described in the Solicitation Protocol Section VI.D, Required Information.**
- **Failure to respond to inquiries by PG&E regarding incomplete or incorrect information could result in disqualification for the RFO**
- **By submitting an Offer in this RFO, each Participant is required to abide by the confidentiality obligations specified in Section IX of the Solicitation Protocol and by selecting “Yes” in the Acknowledgements and Authorizations section of the Participant Information tab of the Offer Form.**
- **If Participants have any questions about the forms, they should submit questions to EnergyStorage@pge.com and cc the IE at waynejoliver@aol.com**

Offer Submittal

Complete Energy Storage Offer Package (by January 31, 2017 by 1:00 PM PPT)

- **Introductory Letter**
- **Appendix A: Offer Form (excel)**
- **Appendix B1: Project Description**
- **Appendix B2: Site Control**
- **Appendix B3: Project Milestone Schedule**
- **Appendix B4: Experience Qualifications**
- **Appendix B5: Electric Interconnection (and most recent interconnection study or description of status of Project interconnection, if required)**
- **Appendix B6: Organizational and Financial Information**
- **Appendix B7: PSA Additional Information (if applicable)**
- **Appendix C: FERC 717 Waiver**

Post-Shortlist Requirements

- **Shortlist Offer Deposit**
- **Appendix D: Confidentiality Agreement**
- **Appendix F1 – F6: Redline of relevant Agreement or term sheet**
- **Appendix G1: Letter of Credit (if applicable)**
- **Appendix G2: Request for Taxpayer ID Form (if applicable)**
- **Preliminary Site Safety Plan**

Offer Form Overview

- **PG&E will host a Participant's Offer Form Webinar on January 10, 2017**
 - **Participants should try out the Offer Form prior to the Webinar**
- **Enable macros when opening the offer form**
- **Instructions tab provides clear directions on completing the offer form**
- **Participants must submit in Excel form. No other formats will be accepted**
- **Each cell with a light yellow background must be filled in. Once completed the light yellow background will disappear**
- **Red triangular tab indicates that help captions are available when you position your mouse over the field**
- **Grayed out cells are auto-calculated cells**
- **The word “complete” will appear at the top of the page when the required cells are filled in**

Keys to a Successful Bid

Keys to a Successful Proposal

- Expect a strong solicitation response
- Review the materials on our website at www.pge.com/rfo/energystorage
- Submit a complete Offer Package by the deadline
 - Eligibility requirements
 - Competitively priced and thoughtfully outlined Offer
- Respond promptly to inquiries by PG&E regarding your Offer
- If you have any questions, please send all communications to EnergyStorage@pge.com and cc the IE at waynejoliver@aol.com

Intermission

Q & A