California Community Power
Long Duration Energy Storage

Notice to Proceed with LS Power Tumbleweed
October 8, 2021 CC Power Special Board Meeting
Objective

Provide background on RFO, evaluation, shortlisting and negotiation process to support approval of Notice of Intent to execute an Energy Storage Service Agreement, and ancillary agreements with, LS Power for Tumbleweed Long Duration Energy Storage
RFO Background & Timeline

June ’20
- Interest & Information Gathering (RFI)

Oct ’20
- CCAs Issue a Joint-Request for Offers (RFO) for up to 500 MW of LDS

Feb ’21
- California Community Power (CC Power) Formed/Long Duration Storage Project Oversight Committee formalized

Jun ’21
- LDS Projects Shortlisted, ESSA Negotiations start, and begin to development of CC Power/CCA Agreements

Jun ’21
- CPUC Issues Mid-term Reliability Procurement Order – LDS POC Develop Pathways to Achieve Compliance

Oct ’21
- CC Power and individual CCA Approval Process for LDS Project #1 – LS Power’s Tumbleweed
# RFO Timeline

<table>
<thead>
<tr>
<th>Activity</th>
<th>Original Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issuance of RFO</td>
<td>October 15, 2020</td>
</tr>
<tr>
<td>Offerors Webinar</td>
<td>October 28, 2020</td>
</tr>
<tr>
<td>Offer Submission Deadline</td>
<td>December 1, 2020</td>
</tr>
<tr>
<td>Project Shortlisting</td>
<td>Mid-May 2021</td>
</tr>
<tr>
<td>Developer/Buyer Negotiations</td>
<td>June – October 2021</td>
</tr>
<tr>
<td>CC Power 60-day Notice for Contract Approval</td>
<td>October 2021</td>
</tr>
<tr>
<td>CC Power Final Contract Approval (Tentative)</td>
<td>December 2021</td>
</tr>
<tr>
<td>Individual CCA Board Approval</td>
<td>December 2021 – February 2022</td>
</tr>
</tbody>
</table>
RFO Objectives & Requirements

Objectives

• Procure cost-effective LDS to integrate renewables & support grid reliability
• Joint-procurement to share resources and project risk
• Meet future potential IRP procurement mandates
• Technology and location agnostic with desire to evaluate emerging technologies
• Full tolls – for capacity and energy value

Requirements

• CAISO resource or Import with dynamic transfer rights
• Must be able to qualify for Resource Adequacy
• Grid-charged with minimum 8-hour discharge duration
• COD no later than June 1, 2026
• Minimum delivery term 10 years
• 50 MW minimum
• Complete bid submission
• Projects on-line as early as 2023
• 51 Entities submitted offers (over 9,000 MW)
• Total of 221 unique pricing offers
  • 160 Full Toll Offers
  • 57 RA Only Offers
• 8 Technology types
  • 18 distinct technologies
• 8,10,12–hour, and multi–day discharge durations

<table>
<thead>
<tr>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
</tr>
<tr>
<td>aqueous-air</td>
</tr>
<tr>
<td>flow</td>
</tr>
<tr>
<td>lithium-ion</td>
</tr>
<tr>
<td>zinc</td>
</tr>
<tr>
<td>Chemical Flow</td>
</tr>
<tr>
<td>iron redox flow</td>
</tr>
<tr>
<td>vanadium flow</td>
</tr>
<tr>
<td>Compressed Air</td>
</tr>
<tr>
<td>Fuel Cell – Hydrogen</td>
</tr>
<tr>
<td>Hybrid</td>
</tr>
<tr>
<td>hydrogen, combined-cycle gas gen</td>
</tr>
<tr>
<td>li-ion, combined-cycle gas gen</td>
</tr>
<tr>
<td>Mechanical – Gravity</td>
</tr>
<tr>
<td>Pumped Hydro</td>
</tr>
<tr>
<td>Thermal</td>
</tr>
<tr>
<td>ice (HVAC)</td>
</tr>
<tr>
<td>liquid air</td>
</tr>
<tr>
<td>molten Salt</td>
</tr>
<tr>
<td>molten Salt &amp; Gas gen</td>
</tr>
<tr>
<td>volcanic stone</td>
</tr>
<tr>
<td>water heat exchange</td>
</tr>
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</table>
Primary Offers

- Identified **98 primary offers** out of the initial list of 221
- Primary offers were chosen based on the following principles:
  - Conforming offers only
  - Lowest price
  - Shortest delivery term (10–15 years)
Evaluation Process

Conforming Y/N and shorten list to 98 offers
Review each offer and determine if it meets minimum criteria

Round 1
Evaluate and Score Projects based on 100-point scoring rubric
Quantitative and Qualitative Assessment of individual projects based on NPV, Risk, Developer experience, Technology, Environmental Impact, and Delivery Term

Round 2
Rank Projects and Identify Top Candidates for Further Analysis
Top Projects per Technology and Max of 10 -17 will undergo further Quantitative and Qualitative Assessment

Shortlist
Project Oversight Committee Recommendation
Two levels of Projects recommended for Shortlisting & Negotiations to CC Power
98 Primary offers were chosen based on the following principles:

- Conforming offers only
- Lowest price
- Shortest delivery term (10-15 years)

All Primary Offers were scored and ranked. Top 17 moved to Round 2
Lithium–Ion vs. Emerging Technologies

• The top 10 projects were the highest scores (all li–ion).
• The remaining 7 spots were allocated to the highest scoring non li–ion projects.
  • The decision to include non li–ion and classify as “emerging technologies” was to introduce technology diversity to the potential shortlist.
  • 56 out of the 98 primary offers represented li–ion
Round 2 – Evaluation Process

Deep dive on 17 primary offers

Project specific NPV, stochastic modeling, assessment of value under various operational strategies

Locational & Interconnection Risk

Labor – Project Labor Agreement, prevail wages, apprentices

Environmental & Environmental Justice

Emerging Technology* specific viability assessment with follow-up interviews

- SCPA, SVCE & Ascend
- SVCE & Gridwell
- PCE
- PCE
- All

*Emerging technologies defined as non-Li-Ion including 2nd life EV, Gravity, Hydrogen, Liquid Air, Compressed Air, Iron Redox Flow, and Pumped Storage Hydro
Round 2 Evaluation: NPV Modeling
Project Value

1. Cost were assumed fixed, with the exception of projects with a variable operating component
2. Expected value ranged from negative to marginally positive
3. Value highly variable and uncertain over time
   1. Location matters
   2. dependent on and how the storage is operated (day ahead vs. real time)
   3. A/S value expected to decrease over time
4. Resource Adequacy value (avoided cost) is dependent on regulatory structure
• Based on updates during round 2, the POC agreed upon a two-tier shortlist.
  • Tier 1 – Offers that scored the highest and received the most confidence in delivering a long duration storage product.
  • Tier 2 – Offers that require more information for CC Power negotiating team to commit to executing a contract.
• The two-tiered approach also provides additional capacity to deal with projects dropping
• Focus of negotiations on Tier 1 Projects
• CC Power General Manager finalized Shortlist
Negotiation Team & Agreements

- Confirmation and refinement of Term Sheet Offer
  - Led to dropping a couple of projects
- Exclusivity Agreements between CC Power & Seller/Developer
- Energy Storage Service Agreement Proforma development
- Credit/Collateral Requirements
- Project Participation Share Agreement
- Operating Agreement
- Pathways – Need based on CPUC requirements, project size and CCA member interest in moving forward and specific projects
Contract Structure

- **LDS Project**
  - Scheduling Coordinator Agreement

- **Energy Storage Services Agreement**
  - Developer
  - CC Power

- **Project Participation Share Agreement**
  - CC Power
  - 7 CCAs

- **Buyer Liability Pass Through Agreements**
  - (Each participating CCA executes with Developer’s Seller entity and CC Power)
Participating CCAs in LDS Procurement

7 CCAs agreed to move forward with joint LDS procurement
Mid-Term Reliability Decision (2023–2026)

D.21–06–035 adopted by CPUC on June 24, 2021 to address mid-term reliability needs

- LSEs required to collectively procure 11,500 MW NQC of new resources
- Follow-on to November 7, 2019 CPUC decision mandating 3,300 MW NQC procurement for 2021–2023 to maintain reliability
- Contract of at least 10 years
- Allocated to LSEs by load share
- Resources must be zero-emission or RPS eligible (no fossil resources)
- 4,500 MW of obligation subject to specific category requirements (next slide)
Timing of overall procurement requirement and specific categories is assigned in tranches between 2023 and 2026

**Procurement Obligation in NQC \(^1\) MW for All LSEs by Category and Year**

<table>
<thead>
<tr>
<th>Procurement Category</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero-emissions generation, generation paired with storage, or demand response resources(^2)</td>
<td>-</td>
<td>-</td>
<td>2,500</td>
<td>-</td>
<td>2,500</td>
</tr>
<tr>
<td>Firm zero-emitting resources(^3)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Long-duration storage resources(^3)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Remaining New Capacity Required</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>7,000</td>
</tr>
<tr>
<td><strong>Total Annual Capacity Requirements</strong></td>
<td>2,000</td>
<td>6,000</td>
<td>1,500</td>
<td>2,000</td>
<td>11,500</td>
</tr>
</tbody>
</table>

1. Obligation is in NQC MW (not nameplate) and subject to ELCC factor (next slide)
2. Zero-emissions resources required to replace Diablo Canyon must be procured by 2025, but may occur in any of the years 2023-2025; therefore, the columns do not add to the total.
3. LSEs may request an extension by February 1, 2023 up to 2028 for the LLT resources. Minimum 8-hour discharge
CPUC released an **ELCC study** in September 2021 to convert facility nameplate to Net Qualifying Capacity (“NQC”)

- 2025 and 2026 figures are indicative and will be finalized by end of 2022

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### Incremental ELCCs for Storage Resources

<table>
<thead>
<tr>
<th>Procurement Category</th>
<th>2023</th>
<th>2024</th>
<th>2025 Indicative</th>
<th>2026 Indicative</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Hour Battery</td>
<td>96.3%</td>
<td>90.7%</td>
<td>74.2%</td>
<td>69.0%</td>
</tr>
<tr>
<td>6-Hour Battery</td>
<td>98.0%</td>
<td>93.4%</td>
<td>79.6%</td>
<td>75.1%</td>
</tr>
<tr>
<td>8-Hour Battery</td>
<td>98.2%</td>
<td>94.3%</td>
<td>82.2%</td>
<td><strong>78.2%</strong></td>
</tr>
<tr>
<td>8-Hour Pumped Storage Hydro</td>
<td></td>
<td></td>
<td></td>
<td>76.8%</td>
</tr>
<tr>
<td>12-Hour Pumped Storage Hydro</td>
<td></td>
<td></td>
<td></td>
<td>80.8%</td>
</tr>
</tbody>
</table>
Long Duration Storage requirement in NQC MW and converted to nameplate using the available 2024 and 2026 ELCCs

<table>
<thead>
<tr>
<th>CCA</th>
<th>NQC MW</th>
<th>Nameplate MW (2024 ELCC)</th>
<th>Nameplate MW (2026 ELCC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CleanPowerSF</td>
<td>15.5</td>
<td>16.4</td>
<td>19.8</td>
</tr>
<tr>
<td>Peninsula Clean Energy</td>
<td>19.0</td>
<td>20.1</td>
<td>24.3</td>
</tr>
<tr>
<td>Redwood Coast Energy</td>
<td>3.5</td>
<td>3.7</td>
<td>4.5</td>
</tr>
<tr>
<td>San Jose Clean Energy</td>
<td>21.5</td>
<td>22.8</td>
<td>27.5</td>
</tr>
<tr>
<td>Silicon Valley Clean Energy</td>
<td>20.5</td>
<td>21.7</td>
<td>26.2</td>
</tr>
<tr>
<td>Sonoma Clean Power</td>
<td>12.5</td>
<td>13.3</td>
<td>16.0</td>
</tr>
<tr>
<td>Valley Clean Energy</td>
<td>4.0</td>
<td>4.2</td>
<td>5.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>96.5</strong></td>
<td><strong>102.3</strong></td>
<td><strong>123.4</strong></td>
</tr>
</tbody>
</table>

Obligation is less than sought through RFO
LDS Project #1

- **Project** – LS Power’s Tumbleweed
- **Product** – 69 MW/552 MWh – Tolling Agreement
- **Location** – Rosamond, Kern County
- **Technology** – Li-ion
- **Interconnection Status** – PCDS
- **COD** – 7/1/24
- **Discharge Duration** – 8 hours
- **Price** – fixed $/kw–mo
- **Term** – 15 years
Tumbleweed Shares per CCA

- Expected capacity share per CCA is based on a pro rata share of CPUC’s Mid-term Reliability Procurement Order

<table>
<thead>
<tr>
<th>Participating CCA</th>
<th>MTR Procurement Capacity Order LDS MW</th>
<th>% of MTR Requirement</th>
<th>Tumbleweed Allocation MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPSF</td>
<td>15.5</td>
<td>16%</td>
<td>11.1</td>
</tr>
<tr>
<td>PCE</td>
<td>19</td>
<td>20%</td>
<td>13.6</td>
</tr>
<tr>
<td>RCEA</td>
<td>3.5</td>
<td>4%</td>
<td>2.5</td>
</tr>
<tr>
<td>SJCE</td>
<td>21.5</td>
<td>22%</td>
<td>15.4</td>
</tr>
<tr>
<td>SVCE</td>
<td>20.5</td>
<td>21%</td>
<td>14.7</td>
</tr>
<tr>
<td>SCPA</td>
<td>12.5</td>
<td>13%</td>
<td>8.9</td>
</tr>
<tr>
<td>VCE</td>
<td>4</td>
<td>4%</td>
<td>2.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>96.5</strong></td>
<td><strong>69.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

- Participating CCAs will seek authority to take a maximum capacity to cover:
  - Increased capacity should a CCA not obtain approval to move forward
  - Step-up capacity of up to 25% of contracted capacity
Tumbleweed Approval Process

**Step 1:** CC Power Board issues 60-day notice to consider ESSA for approval in December - Today

**Step 2:** CC Power Board approves ESSA, PPSA, BLPTA & Operating Agreement condition on individual CCA Approval

**Step 3:** CCAs seek respective Board Approvals of PPSA, BLPTA and Operating Agreement

**Step 4:** Tumbleweed Agreements become effective

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**October**  
CC Power Board issues 60-day notice to consider ESSA for approval in December

**November**  
Finalize Tumbleweed ESSA and CC Power/CCA Supporting Agreements

**December 8th***  
CC Power Approves LS Power Tumbleweed *tentative

**December 2021 – March 2022**  
Participating CCAs Approve Participation Agreements  
ESSA with LS Power Tumbleweed

Process will be repeated for additional LDS Project Agreements – condition on negotiations and interest from other CCAs
1. Tumbleweed NPV to participating CCAs is highly uncertain
2. Procurement of Long Duration Storage (8–hours or more) is mandated through MTR order
3. LS Power’s Tumbleweed project will meet 56 to 68 percent of participating members MTR obligation
4. Tumbleweed COD is 2024, which may provide for a greater ELCC (94.3%) than 2026 COD (78.2%). Seeking CPUC clarification
5. Seeking provisions for prevailing wages, a PLA and prohibition of forced labor.
Approve Resolution No. 21–10–02 to provide 60-Day Notice of Intent to Execute Energy Storage Agreement with LS Power Tumbleweed for Long Duration Energy Storage.
# Credits

## Project Oversight Committee

<table>
<thead>
<tr>
<th>CCA</th>
<th>POC Member</th>
<th>Other Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>CleanPowerSF</td>
<td>Michael Hyams</td>
<td>Erin Mulberg</td>
</tr>
<tr>
<td>Peninsula Clean Energy</td>
<td>Siobhan Doherty</td>
<td></td>
</tr>
<tr>
<td>Redwood Coast Energy</td>
<td>Richard Engel</td>
<td>Jocelyn Gwynn</td>
</tr>
<tr>
<td>San Jose Clean Energy</td>
<td>Jeanne Sole</td>
<td>Phil Cornish</td>
</tr>
<tr>
<td>Silicon Valley Clean Energy</td>
<td>Monica Padilla</td>
<td>Karthik Rajan</td>
</tr>
<tr>
<td>Sonoma Clean Power</td>
<td>Deb Emerson</td>
<td>Ryan Tracey and Hannah Rennie</td>
</tr>
<tr>
<td>Valley Clean Energy</td>
<td>Gordon Samuel</td>
<td></td>
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</tbody>
</table>

Gridwell Consulting – Carrie Bentley  
Keyes & Fox – Kevin Fox  
Ascend Analytics – David Millar, Brent Nelson and Valerie Katz  
BBSW – Tony Braun, Justin Wynne, Brittany Iles, Kris Kirkegaard  
Timothy Haines