



## MEMORANDUM

### **Public Utilities Department** *Power Resources Division*

**DATE:** October 10, 2019

**RE:** Attachment 3: Avangrid Camino Solar PV + BESS Proforma Details

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The following documentation describes and quantifies the information and assumptions used in the attached Avangrid Camino Solar PV + BESS financial assessment (Performa).

#### **1. Simulation Runs**

Three simulation runs were performed in order to properly analyze the financial metrics associated with this Solar PV + BESS, as described below.

1. Avangrid Base Solar Pattern – this run simulated the total output from the solar facility, assuming all energy flow directly to the point of interconnection (POI). (No BESS is assumed to exist in this first simulation.)
2. Avangrid Solar w/Batt Charge Pattern – this run simulated the net output from the solar facility to the POI, after diverting sufficient solar output to fully charge the BESS each day. Note that this diverted charge also includes all BESS energy losses.
3. Avangrid Solar w/Batt ChargeDischarge Pattern – the final run simulated both the net output from the solar facility and the full discharge output from the BESS to the POI, after accounting for all BESS energy losses.

Each simulation tracked the following variables at an hourly granularity level, before rolling-up all results into annual totals: (1) energy generation, (2) energy cost, (3) gross market revenue, and (4) net market revenue. However, note that the Proforma Calculations (shown below the PCM simulation runs) have been designed to automatically calculate all energy and capacity costs based on the specified input solar price (cell B25, \$/MWh), battery cost (cell B26, \$/kW-month) and battery size (cell B27, MW). Hence, the Proforma only needs/uses the energy generation and gross market revenue data from the simulations, since all energy and capacity costs are directly computed using the above input variables and simulated energy generation.

#### **2. Primary Proforma Calculations: Expected Net Market Revenue from Energy Sales**

Row 29: expected energy costs, for all energy reaching POI

Row 30: fixed capacity cost (for BESS)

Row 32: expected energy needed to fully charge BESS each day

Row 33: cost of BESS charging energy, after netting out energy losses

Row 35: expected discharge energy from BESS, assuming BESS fully discharges each day

Row 36: expected market revenue for BESS discharge energy

Row 37: expected net revenue generated by BESS, after accounting for fuel costs

Row 38: expected net solar PV output sent to POI (net of energy diverted to BESS)  
Row 39: expected cost for net solar PV energy  
Row 40: simulated gross market revenue for net solar PV energy  
Row 42: net revenue associated with BESS, after adjusting for capacity costs (but before adding back extra FRAC-RA value)  
Row 43: net revenue associated with net solar PV energy  
Row 44: total net energy revenue (rows 42+43)

**Summary Metrics:** Project TNER (sum of row 44), ROI-Energy (cell D46 / sum of rows 29+30), \$/MWh TPC (total cost / total generation), \$/MWh TPR (total revenue / total generation).

### 3. Secondary Proforma Calculations

**Value of System RA:** This 44 MW solar PV facility is expected to qualify for a certain amount of system RA, specifically 22.58% of its nameplate capacity (9.93 MW). Our 2018 IRP used a system RA value of \$4.50/kW-month, which equates to \$4.91/kW-month (or \$58.92/kW-year) in 2021 when escalated annually at 3%. The “Additional System RA Value” shown on row 54 quantifies this total value stream.

**Cost and Value associated with Additional FRAC-RA:** The addition of this 44 MW solar PV project to RPU’s portfolio is expected to add 22 MW of additional FRAC-RA requirements to the utility. The BESS is expected to off-set approximately half of this CAISO imposed requirement (see the calculated BESS capacity values in row 50). The residual FRAC shortfall will need to be either purchased from the market or met using a RERC unit. In either scenario, the “Net Additional FRAC-RA Costs” shown on row 58 quantify these annual (implied or direct) costs. Note: RPU has already purchased 2021 FRAC-RA at a cost of \$6.92/kW-month (or \$83.04/kW-year), and again we assume that this cost will escalate 3% annually.

**Implied Value of PCC-1 RECs:** This project will generate Portfolio Content Category 1 RECs (specifically, the annual amounts shown on row 20). Assuming that PCC-1 RECs are valued at \$20/MWh in 2020 and escalate 3% annually, row 60 quantifies the annual implied REC value stream.

**Summary Metrics:** Implied System RA Value (sum of row 54), Implied Extra FRAC-RA Costs (sum of row 58), Implied REC Value (sum of row 60), Project TSV (sum of cells D46, D62, D63, and D64), ROI-Project (cell D65 / sum of rows 29+30).

**Extra Notes:** the calculated standard deviation for the projected 36.74 M\$ Total Net Energy Revenue (TNER) estimate is 4.72 M\$. (Results on file.)

