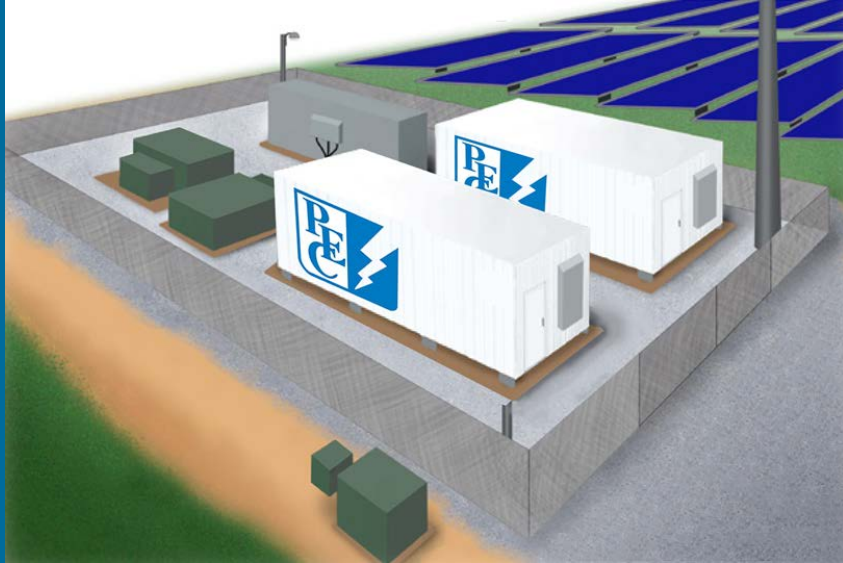


Resolution – Approval of Battery Energy Storage Solution Project

Ingmar Sterzing, VP Power Supply and Energy Services



The Battery Energy Storage Solution (BESS) Project Background and Overview

- Application for Texas Commission on Environmental Quality (TCEQ) battery project grant submitted Fall '16
- PEC Board authorizes acceptance of grant pending establishment of favorable business case and competitive solicitation process (February '17)
- TCEQ awards project grant to PEC in March '17 for up to 50% of project cost or not to exceed \$1.5 Million
- Project planning and development completed Summer '17
- Competitive solicitation for Engineering, Procurement, and Construction (EPC) services of Battery Project completed Fall '17
- Feasible project model and favorable business case has been established with IRR of 20.7%, NPV of \$2.5 Million, and Payback of 5.4 years.
- PEC Board approval and authorization required for the capital project and to award EPC contract to battery project vendor
 - Total project cost: \$3.3 Million (Without grant reimbursement)
 - PEC project cost: \$1.8 Million (With \$1.5 M grant reimbursement)
 - Authority to execute EPC and O&M contract with 5 year term (solicitation, vendor selection, and specific terms to be discussed in executive session)

Battery Energy Storage Solution Project Summary

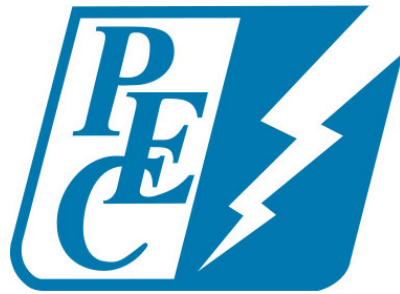
- Proposed system of 3 units,
 - Capacity of 0.750 MW each
 - Energy of 1.64 MWh each
- Full turnkey EPC development
- Revenue guarantee for the first 5 years
- Full compliance with efficiency guarantees
- Warranty including all spare parts up to replacing batteries for 5 years
- Proven Software and control technology
- Efficiency guaranteed for 5 years

Approval Request	Boundary Condition
Battery Energy Storage Solution	2.25 MW/4.9 MWh Turn key Battery Energy Storage Solution
Total Project Cost (without TCEQ Grant)	\$3.3 MM
TCEQ Grant	\$1.5 MM Reimbursement
Total Project Cost to PEC (with TCEQ Grant)	\$1.8 MM
EPC Contract	Award contract to best evaluated vendor through PEC procurement processes as discussed in executive session
Term of contract and structure	EPC and O&M agreement with 5 year term
Site	Johnson City Substation

TCEQ Project Requirements

- Chemistry of Lithium Ion
- Submit annual report for 5 Years
- 50% cost reimbursement for balance of BESS equipment not to exceed \$1.5MM
- BESS must be on same circuit as solar project
- Equipment reimbursement valid through May 2019





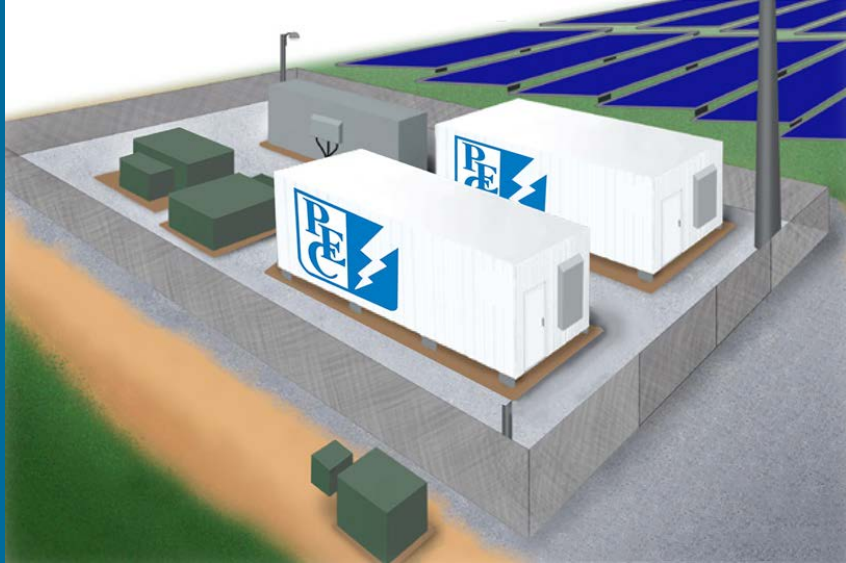
PEC Evaluation Team

Jim Spaulding	Project Development
David Thompson	Regulatory Affairs
Daren Curry	Engineering
Jerry Bible	Substations
Judy McElroy	Fractal
Daniel Crotzer	Fractal

Battery Solicitation (RFP) Process

- Completed a public, competitive Request for Proposal (RFP) process
- Fractal, Energy Storage Consultants, assisted PEC in the process to leverage industry experience and best practices
- Leveraged PECs structured procurement evaluation process
- Total of 10 responses evaluated by team
- RFP process looked at all aspects of the company including ability to deliver a turn-key package as well as the companies project history and financial stability
- Following the initial evaluation the top 2 proposals were selected for in-person interviews and presentations
- The best offer was selected to provide the most value to PEC (based on the proposal, interview and final offer)





The Battery Energy Storage Solution Project Benefits

- Hedge cost of PEC Ancillary Service Obligation* with self procured storage
- Energy usage shifting helps avoid peak energy pricing
- Flexible design configuration allows for shifting BESS to offset 4CP fees if optimal
- Learn from project and apply knowledge to enhance system reliability, support member projects, and defer distribution infrastructure capital projects

*Ancillary Service Obligation is mandatory as an ERCOT Load Serving Entity (LSE)

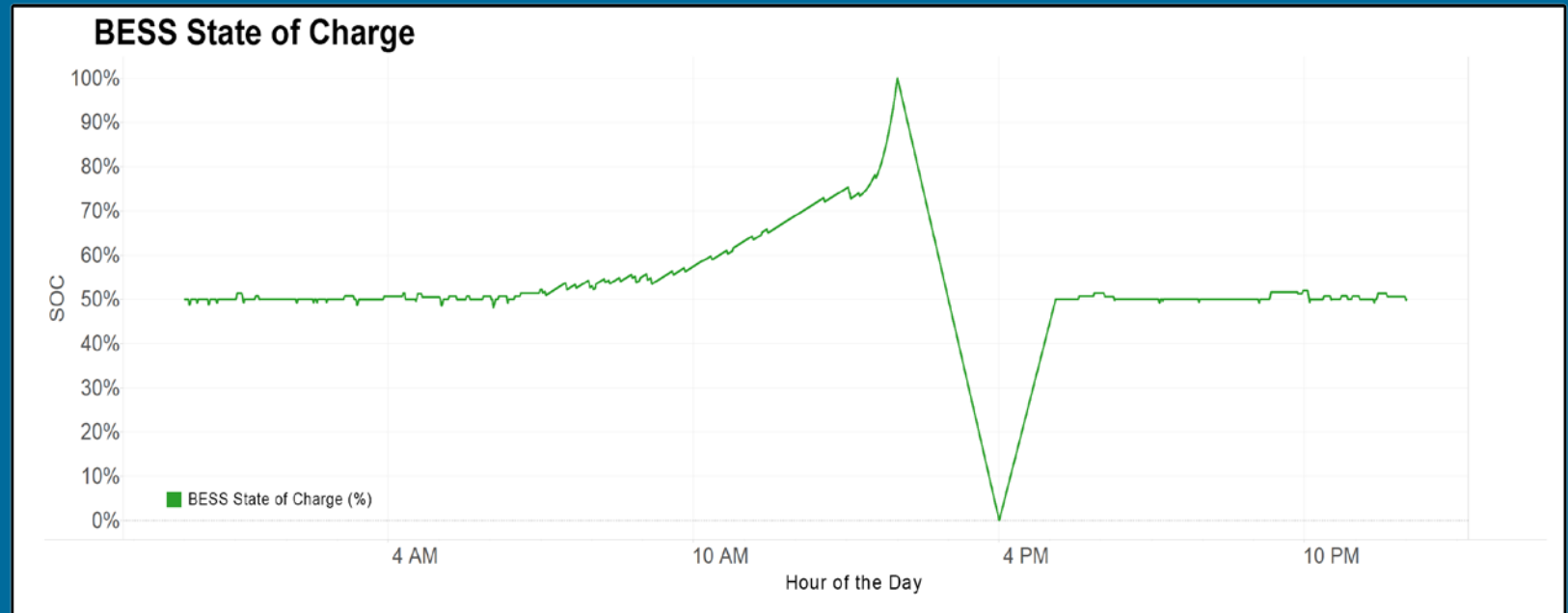
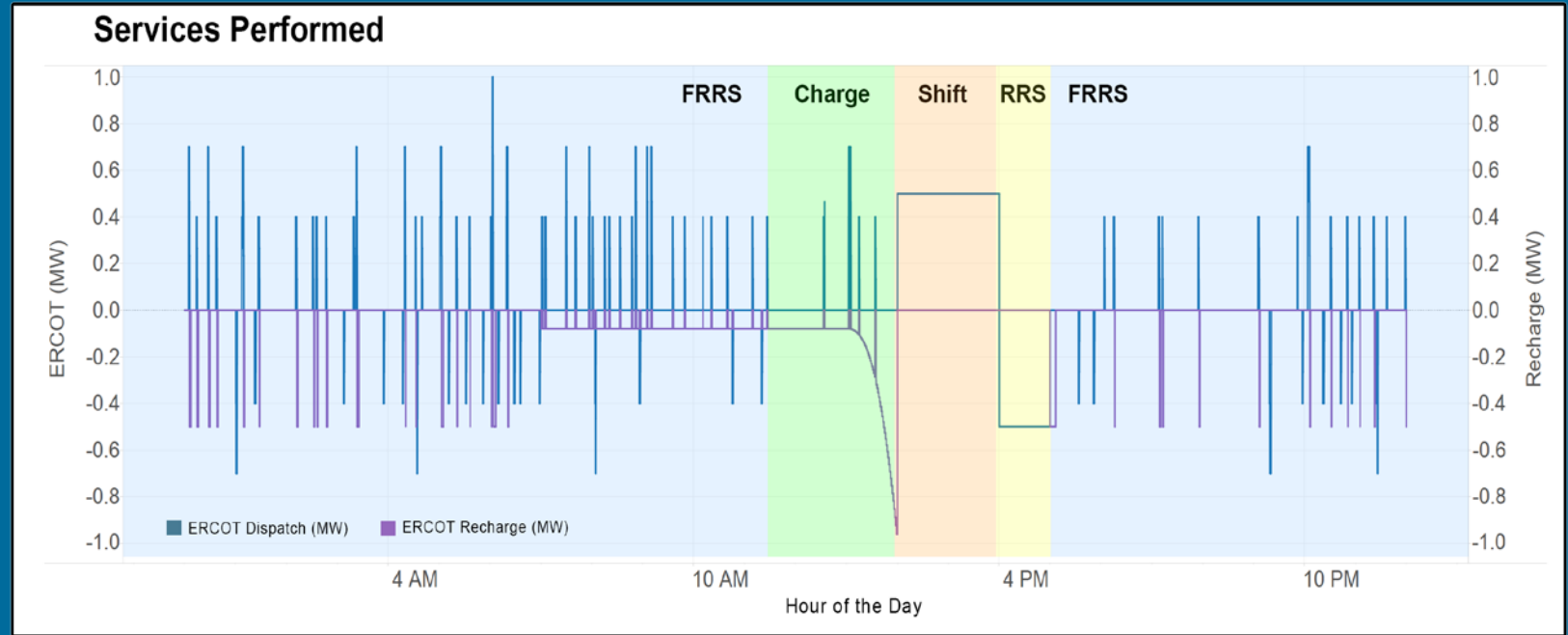
Example of Sample Day for Battery Operation

FRRS (Fast Responding Regulation Service) – Performed at all other hours.

Charge – BESS charges from wholesale electricity rates during off-peak. Starts two hours before the Shift.

Load Shift – Sell 2 hr of wholesale energy during peaks times.

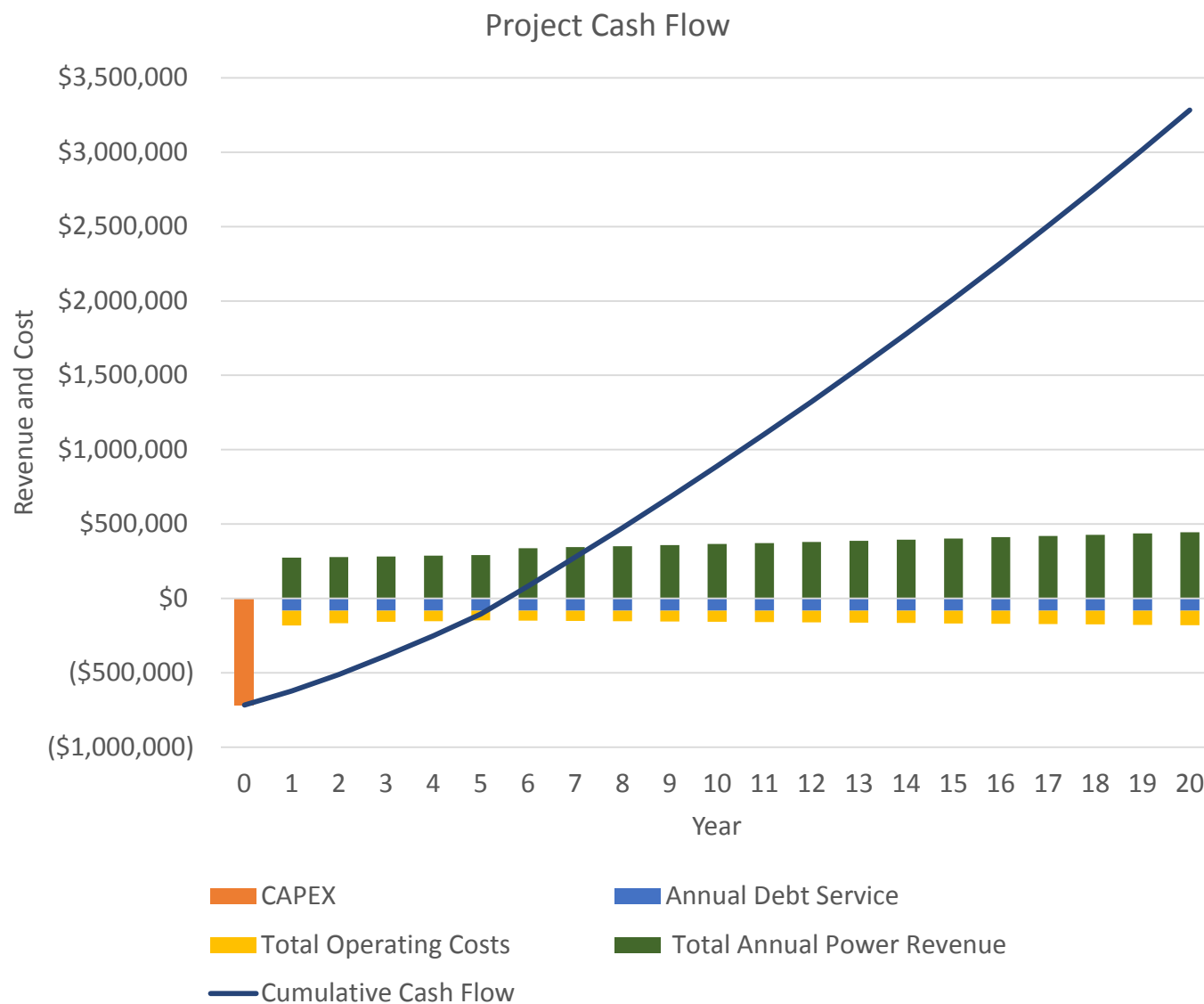
RRS (Responsive Reserves Service) – Offset charge during near-peak (covers 50% of charging cost). Duration: 1 hr (after Shift)



Project Financial Summary

(Base Case)

- NPV: \$2,573 k
- IRR: 20.7%
- Payback: 5.4 years
- Total Project Cost: \$3,293 k
- TCEQ Reimbursement: \$1,500 k
- Total PEC CapEx: \$1,793 k
- 2018 Expense: \$717 k (40% of CapEx)
- Financed: \$1,076 k (60% of CapEx)
- Annual Avg. Revenues: ~\$363 k/year
- Annual Avg. Expenses: ~\$163 k/year
- Annual Avg. Net Benefit: ~\$200 k/year



Risk Management and Stress Testing

Alternative business models and configurations provide favorable benefits in the event the primary business model assumptions are not valid or structural changes occur in the ERCOT market.

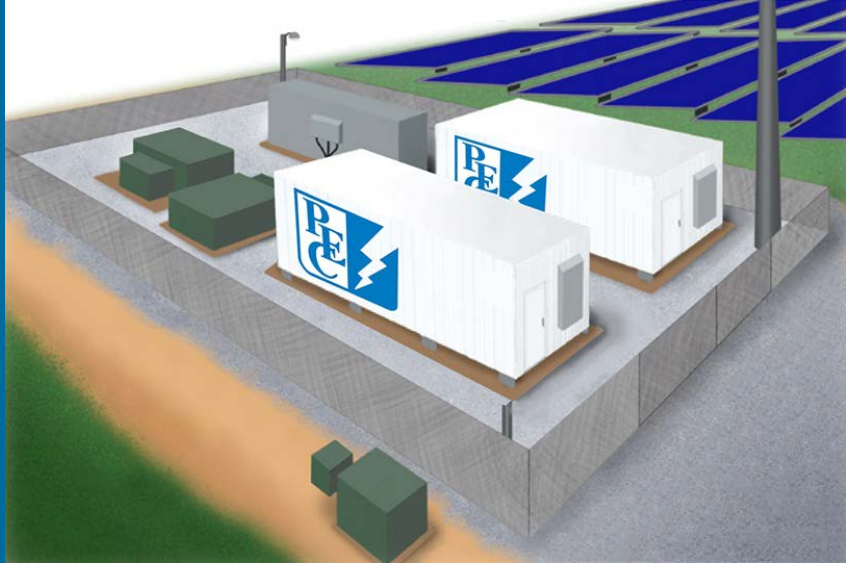
	Configuration				Switch to Option 3 after 7yrs
	Basecase	Option 1	Option 2	Option 3	
IRR	20.7%	16.3%	11.4%	5.8%	15.1%
Payback	5.4	6.5	8.5	13.0	5.4

IRR sensitivity of escalation rates for ERCOT services versus the debt/equity

		Escalation Rate						
		2.0%	2.5%	3.0%	3.5%	4.0%	4.5%	5.0%
Debt	0%	12.7%	13.3%	13.9%	14.5%	15.1%	15.6%	15.0%
	20%	14.2%	14.9%	15.5%	16.2%	16.8%	17.5%	16.8%
	40%	16.6%	17.3%	18.1%	18.8%	19.5%	20.2%	19.5%
	60%	20.7%	21.6%	22.5%	23.3%	24.1%	24.9%	24.2%
	80%	30.8%	31.9%	33.0%	34.1%	35.1%	36.1%	35.6%

- Regulation Service as FRRS provides the greatest benefit to PEC by reducing PEC's market price exposure to PEC's Ancillary Service Obligation
- Battery modules can be repositioned to provide other service benefits such as energy shifting and 4CP cost reduction
- If Ancillary Service Regulation pricing is not optimal at some point in the future the primary function of the battery can be re-purposed to Energy Shifting and Demand Reduction
- Technology risk mitigation has been addressed with technology and performance guarantees from the vendor including revenue guarantee and equipment replacement





Johnson City Substation

Next Steps and Project Timeline

- Finalize EPC Contract Jan '18
- Construct Facility Feb-Apr '18
- Commission System Apr '18
- Initiate Operations May '18
- Reimbursement from TCEQ June '18
- TCEQ reporting 5 years

