



POWIN ENERGY MILLIKAN I PROJECT BATTERY ENERGY STORAGE SYSTEM

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Energy Storage and Distributed Energy Resources Workshop
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Full Range of Energy Market Services

CES

Market IQ

ISO Reporting
Rule Changes
Regulatory

Wholesale Services

Dispatch
Scheduling
Monitoring
Bidding
Telemetry
Settlements
24 Hour Desk
Market Participant
Market Optimization
DA / RT Strategies
CES|GOLD

Retail Services

Market Entry
EDI/Billing
Forecasting
Scheduling
Settlements
Pricing
Congestion Management
Headroom Analysis
Managed Portfolio Services

Demand Response

DR Mgmt
CES|GREEN
SecureNet
Tracking
Settlement

Congestion Mgmt

ARR Analysis
FTR Analysis
Congestion Analysis
Power Flow Studies

Renewable Mgmt

RPS Management
Plant Registration
REC Optimization
Compliance

Emerging Technologies

Storage IQ
CoMETS Valuation Models
Forecasting Storage Market Size
Market Entry & Business Strategies
Storage Rules
Technology Due Diligence
Microgrids

CES Offices



Customized Across the Globe

Customized Energy Solutions (CES)



- CES manages approximately 9,000 MWs of capacity across six ISO/RTOs in North America including over 100MWs of Energy Storage.
- CES is a certified CAISO Scheduling Coordinator under the affiliate name of Galt Power.
- CES has been scheduling in the CAISO market since 2010.
 - Currently schedule for Dispatchable Renewables, Direct Access Load, Proxy Demand Resources, and Energy Storage.

CES is objective and independent--not affiliated with any trading, marketing, distribution or transmission companies

OUTLINE

- Project Owner / Project Information (3 slides)
- Market Participation Issues (1 slide each)
 - Infeasible AGC Dispatch
 - Persistent AGC Dispatch
 - Accuracy Scores

Project Owner: esVolta

esVolta is a leading North American utility-scale energy storage platform

Highlights

esVolta launched in 4Q 2017

- Develop, build, own, operate business model
- Focus on greenfield development and M&A in the North American utility-scale storage market
- Contracted project portfolio of 116 MWhs
- Additional 800+ MWhs in development pipeline



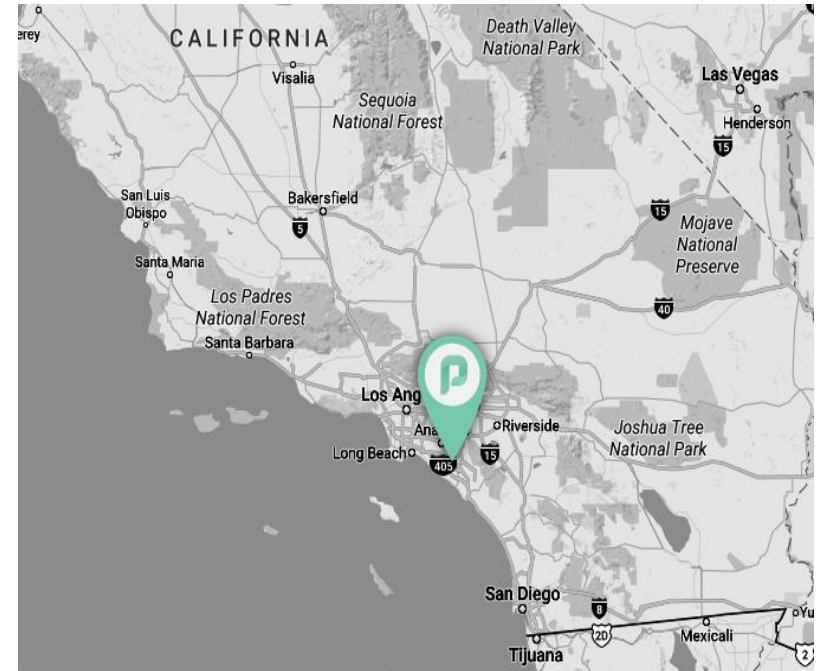
Strengths

Resourced to achieve market scale

- Dedicated team for project development, financing, management and operations
- Long-term capital commitment from Blue Sky Alternative Investments, a global infrastructure investor
- Strategic procurement relationship with Powin Energy Corporation, a leading lithium-ion battery storage technology integrator

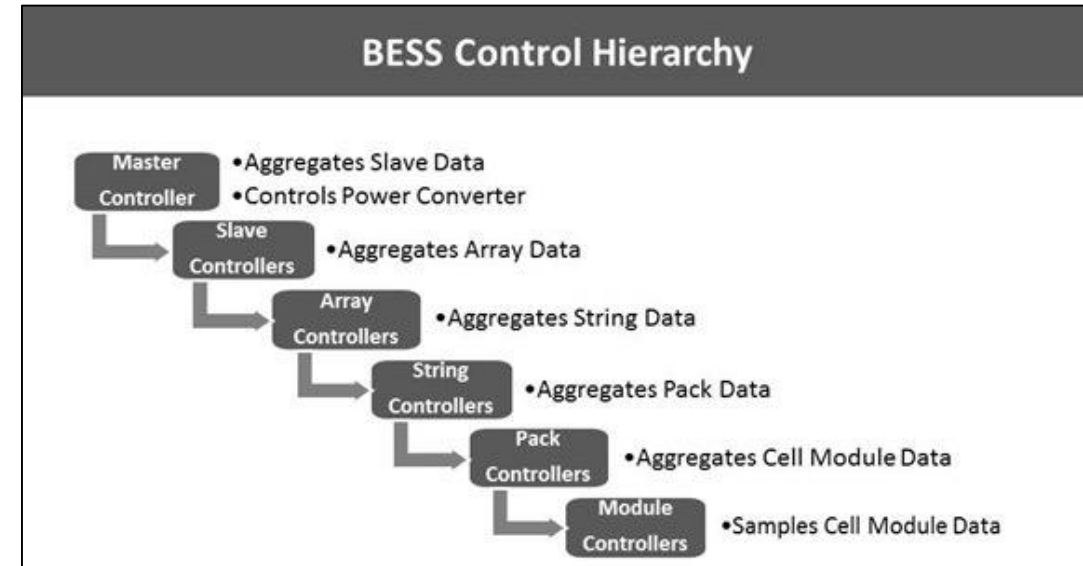
PROJECT INFORMATION

- **Size:** 2 MW/8 MWh
- **Technology:**
 - Powin Energy BP400+ BESS
 - Lixin LiFePO4 cells (lithium iron phosphate)
 - Eaton Energy Xpert 2 MW inverter
- **Operation:** Day Ahead and Real Time Energy, Regulation
- **Interconnection:** SCE medium-voltage grid
Virgo 12 kV distribution line out of Estrella 66/12 kV substation



PROJECT INFORMATION

- BESS Control
 - Industry exclusive Powin bp-OS
 - Battery Odometer™
 - Warranty Tracker™
 - BMS
 - Patented in US and China
- Modular design
 - Scalability
 - Speed of deployment
- CES Secure | Net Remote Intelligent Gateway (RIG)

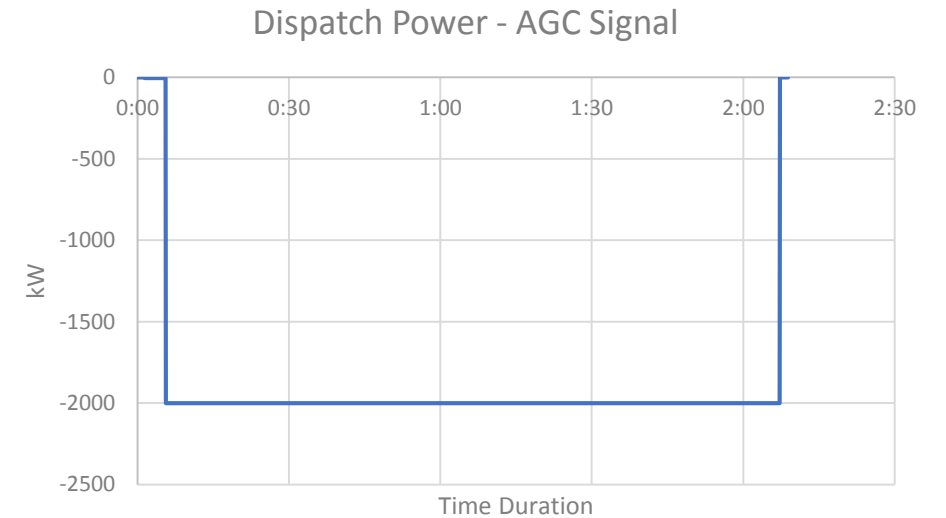


INFEASIBLE AGC DISPATCH

- Continuing to receive AGC signals to CHARGE after hitting MAX SOC
- CIDI Ticket filed in August 2017 – Received several iterations of responses, but nothing conclusive
- Observed improvements soon thereafter
- Recently started seeing infeasible dispatches again
- 8 such occurrences of sustained infeasible dispatch week of 1/1/2018

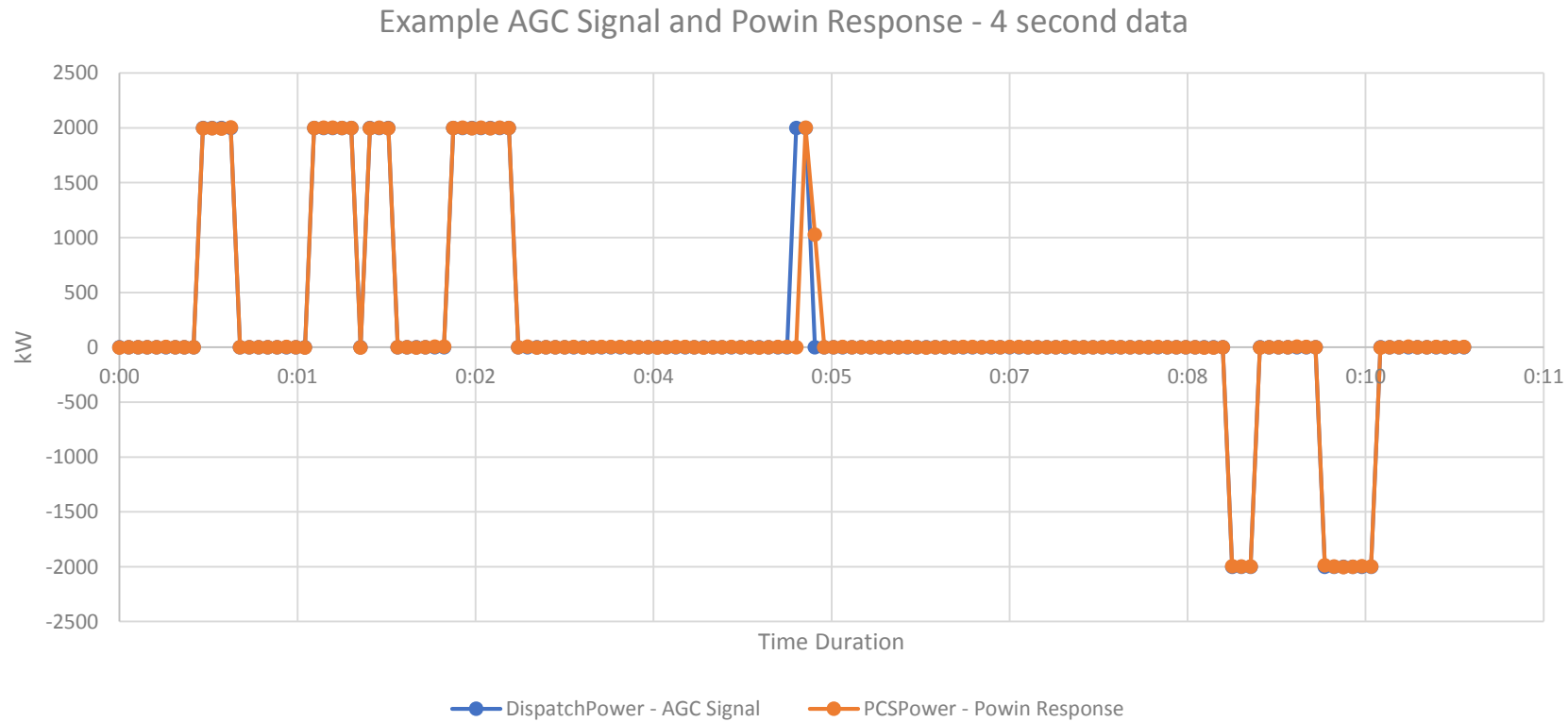
PERSISTENT AGC DISPATCH

- Many occurrences of >1hr constant Reg Down CHARGE signal
- Consistent dispatch pattern occurring in certain hours



ACCURACY SCORES

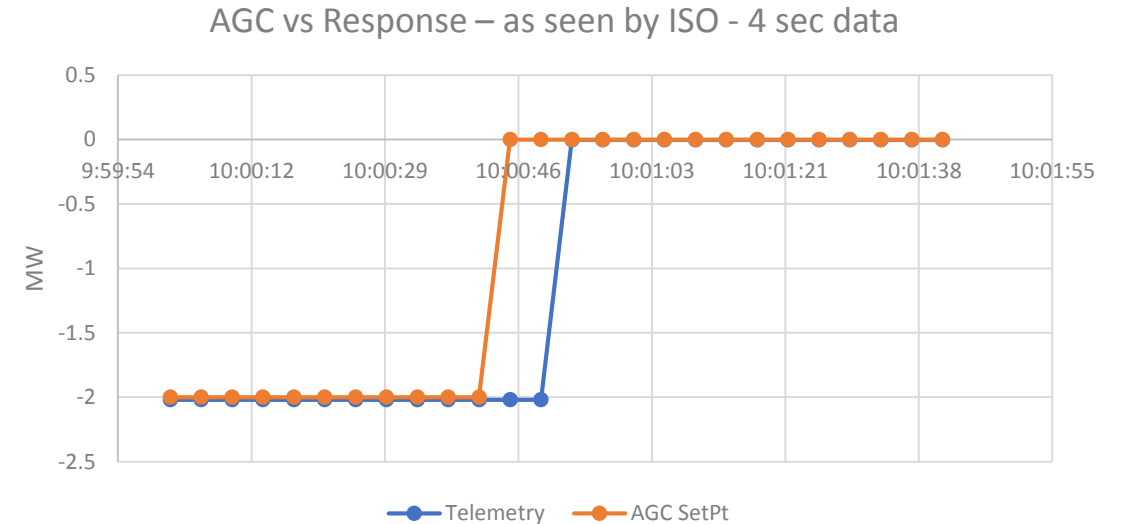
- ISO Settlement Accuracy data is not what we see in our internal data



ACCURACY SCORES

- How is latency treated?
- Lack of clarity on calculation...
 - *4 Second data used in calculation not published*

- Ramp Rate determination – lacks transparency
 - *Ramp rates calculated by ISO from Operational Test versus Regulation Test were very different and both were not representative of experience during the test or unit capability.*



POWIN ENERGY - MILLIKAN I

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